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UNDECIMO CONGRESO MUNDIAL DE AVICULTURA

La Secretaría de Agricultura y Ganadería de México invita oficialmente y con toda cordialidad, a todos los miembros de la Asociación Mundial de la Ciencia Avícola para asistir al Undécimo Congreso Mundial de Avicultura, que se efectuará en la Ciudad de México, México, del 21 al 28 de septiembre de 1958.

Constituye un motivo de agrado hacer extensiva esta cordial invitación a todas las personas y organizaciones interesadas en los importantes temas avícolas que se promoverán en el Congreso, y que serán discutidos en español e inglés.

Anticipando una asistencia numerosa y mundial, y en reconocimiento al valioso interés y cooperación de todos los participantes, la Secretaría de Agricultura y Ganadería de México anticipa su entusiasta bienvenida.

Dr. Lauro Ortega
Subsecretraio de Ganaderia

ELEVENTH WORLD'S POULTRY CONGRESS

The Department of Agriculture and Animal Husbandry of Mexico cordially extends official invitation to all members of the World's Poultry Science Association, to attend the Eleventh World's Congress on Avriculture to be held in the City of Mexico, Mexico, from Spetember 21 to 28, inclusive, 1958.

It is her privilege to make this cordial invitation extensive to all and any individuals and organizations interested in the important topics pertaining to Aviculture which will be promoted at the Congress, and discussed in Spanish and English.

Anticipating a worldwide attendance, and in appreciation of valued interest and cooperation from all participants, Mexico's Department of Agriculture and Animal Husbandry advances its warm welcome.

Dr. Lauro Ortega
Under-secretary of Animal Husbandry

THE CITY OF MEXICO—SITE OF THE XI WORLD'S POULTRY CONGRESS AND ITS SURROUNDINGS

DR. LAURO ORTEGA
Subsecretario de Ganaderia, Mexico, D. F.

The City of Mexico, formerly named Tenochtitlán, was founded by Tenoch in 1325. It spread over a zone of lakes, and its palaces, "teocallis" or temples, broad avenues and floating gardens dazzled the Spanish conquerors after their journey from the Veracruz shores.

On the Spaniards' arrival, and after the inhabitants' surrender, the temples and palaces were demolished and the Great Tenochtitlan's aspect was gradually transformed developing into the City of Mexico, the kingdom's capital.

Four hundred years have elapsed since the Conquest took place, and the City of Mexico has blossomed into one of the most beautiful capitals of the world, with its ancient palaces, plazas, remote typical sites, modern buildings, and its fountain-speckled parks which provide relaxation for all.

Mexico City's beautiful surrounding areas, where the imposing University City has been erected and where the majestic Chapultepec Park is located, are easily accessible over ample avenues and boulevards.

The most important sessions of the Poultry Congress are to be held at University City, but the inauguration of this worldwide event, as well as the exposition and sundry festivities, will take place at the modern Auditorium and at the Army Club.

All conveniences will be available to participants from all countries, official as well as private parties, for issuance of courtesy permits and facilities in Customs proceedings.

Besides tours over the most outstanding spots of Mexico City, planned for all interested parties, the Committee in Charge has mapped out short trips to different towns such as Acapulco, Cuernavaca, Taxco, Fortîn, Tehuacán, Oaxaca and Mérida.

These short trips of 2, 3 and 4 days duration will be taken prior to the Congress' opening. Their organizers have carefully scheduled them, so that visitors may return on September 20 at the latest, in readiness for the Mexico City Congress' inauguration.

Attention has been given to the planning of attractive trips, so that visitors may not only visit historical and typical sites but also take in various aspects of the country's folklore.

Applications are to be made by interested parties to the Committee in Charge.

Preliminary schedules follow:

Trip #1.—To the beautiful Port of Acapulco, three day trip, departure on September 14 to return on the 17th.

Trip #2.—Taxco and Cuernavaca, two day trip, September 18 to 20. On this trip visitors will have an idea of old colonial architecture and atmosphere.

Trip #3.—Fortîn and Tehuacán, three day trip to be taken from September 17 to 20. Tropical ways and customs will be looked into.

Trip #4.—Oaxaca, three day trip, from September 15 to 18. The visitors will see the archaeological zone of Monte Albán and Mitla.

Trip #5.—Mérida, three and four day trips, from Steptember 16 to 20. The ruins of Uxmal are one of the great sights and those of Chickén Itzá are easily accessible.

Complete information on itineraries will be furnished to all interested parties by the Committee in Charge.

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GROWTH OF THE POULTRY FEED INDUSTRY IN MEXICO

(An English translation of an article written for the World's Poultry Science Journal by Dr. Juan Manuel Michel, Director Técnico, Api-Aba, S.A. México)

The present article has not required an arduous review of literature or of statistical data by reason of the fact that the feed industry in Mexico is still embryonic. This is to say that the industry had its inception only about 8 years ago, with more modern scientific development within the past 3 years. From a total prepared feed production of less than 100 tons monthly, the feed industry is now producing approximately 30,000 tons of poultry feeds monthly. Before the use of balanced formulas, history shows that animal feeding in Mexico was based exclusively upon the use of simple formulas and practices evolved by farmers. Many of these are still widely used in Mexico.

More recently, another group of farmers who began to raise poultry commercially started to mix their own feeds using modern techniques and information. Finally, within the last ten years there has developed in Mexico the producers of balanced commercial feeds on a large scale.

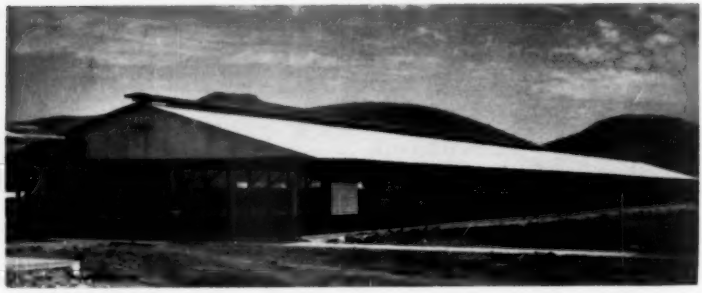
At the present time, with the commercial feed producers appearing on the scene of this young industry, there has developed the impact of competition. This competition has created the need for feed manufacturers to demonstrate the value of their product to consumers. The producer must establish confidence in the poultryman and encourage him to abandon old techniques as well as home mixed feeds in favor of scientifically balanced formulas.

In the beginning, feed companies, because of abuses and poor quality of their products caused grave consequences. Consumers lost confidence and many of them were forced to formulate and prepare their own feeds. As a result hog and poultry raisers now require that commercial feeds have high quality and low prices.

The growth of the poultry feed industry in Mexico depends in large measure upon that sector of poultrymen who prepare their own feeds according to their own formulas. The commercial feed manufacturer must, by all means of his disposal, insure the quality of his feed and compete with

home mixed feed prices in an attempt to win over these small producers.

The future of the animal feed industry in Mexico must be based upon honesty in prices, dissemination of research, and technical assistance to all poultry growers in the Republic both large and small. The feed industry is going through growing pains. As the wisdom and experience of the farmer increases in matters of a poultry nature, so is the feed industry developing and learning to anticipate the needs as well as the desires of the poultryman. Our poultry and animal industry is expanding rapidly in keeping with a sound national economy. Feed manufacturers forsee a bright future in Mexico.



Many modern poultry installations may be found throughout the Republic of Mexico. This is one of six 2,000 bird cage layer houses on a poultry ranch in Cuernavaca.

METHODS AND PRACTICES CURRENTLY USED IN MEXICO FOR THE CONTROL OF POULTRY DISEASES

(An English translation of an article written for the World's Poultry Science Journal by Dr. Oscar Valdés Ornelas, Director de la Escuela Nacional de Medicina y Veterinaria, Ciudad Universitaria, México)

In the Republic of Mexico the methods followed by poultrymen for the prevention and control of poultry diseases are very diverse. Some poultrymen use methods found to be at the most recent levels of scientific achievement, while others, fortunately fewer in number, continue old empirical methods, which do not lend themselves to any assurance for gaining the objectives for which they are used.

In the present article we will touch briefly upon the methods commonly used for prevention and control of the most commonly found poultry diseases in Mexico.

Virus Diseases

The frequent incidence of virus diseases has deep repercussions on the poultry economy of the country not only because of deaths but also because of reduced production of eggs and meat. Within the last decade the poultry population was drastically reduced by widespread epidemics of Newcastle disease.

Even though routine vaccination against Newcastle disease is now practiced by the poultryman, this disease continues as one of the primary problems occuring frequently in poultry flocks. Approximately 65% of the vaccination done is with commercially prepared live virus vaccines, while the other 35% is done with dead virus vaccines. Commercial live vaccines for application by intranasal, intraocular, intramuscular, in drinking water, or by aspersion applications are prepared from B-1 and La Sota 717 strains of virus, while for the wing web method vaccines are prepared from the Roakin strains of virus. Unfortunately, to date little if any vaccine is produced with locally isolated virus strains.

Of the previously listed methods of application, the most prefered by poultrymen are intranasal and oral (drinking water vaccination). This latter method of en masse vaccination is increasing daily because of the facility of application to poultry of all ages. Usually, vaccination is applied intranasally or orally to chicks less than a week of age, with revaccination at 4 weeks with either method and for the second

revaccination at 4 months; some use the same method of vaccination procedures, others change to intramuscular or wing web procedure. Laying flocks frequently are revaccinated at 3 or 4 month intervals using intranasal or drinking water vaccines. One may frequently encounter poultrymen who revaccinate laying flocks with dead virus vaccines because they feel that live virus vaccination tends to reduce production. During an active outbreak of Newcastle, the most common practice is to apply dead virus simultaneously with injectable streptomycin and penicillin or else terramicin or bacitracin in high concentrations in feed. In this case the feed is usually also fortified with additional vitamins.

Aside from Newcastle diseases in Mexico, the other virus disease for which vaccination is practiced is fowl pox. The classical method of immunizing with live fowl pox virus vaccine is followed. It is applied from 8 to 10 weeks of age, or sooner in some areas. When an active outbreak occurs or it is necessary to vaccinate younger birds, pigeon pox is used.

The only method used for the prevention of leukosis is to rear replacement stock at a distance from adult poultry, using different personnel and taking sanitary precautions. Many poultrymen are very much interested in securing chicks from flocks with low incidence of leukosis. This information is difficult, if not impossible, to obtain from chick producers in Mexico. However, better poultrymen attempt to eliminate those birds which show clinical symtoms as well as those suspected of having diseases.

The infrequent occurence of laryngotracheitis as shown by clinical and laboratory methods does not justify the broad application of vaccines or vaccination procedures against this disease and for this reason the Mexican authorities do not permit importation, manufacture, sale, or application of laryngotracheitis virus.

In the same category and for the same reasons, infectious bronchitis vaccination is not done in Mexico. Among the practices most generally used by poultrymen for the control of virus diseases or diseases of unknown etiology, aside from vaccination in the case of diseases already mentioned, is the application of high levels of vitamins and antibiotics in the diet, the elimination of sick animals, and the application of sanitary measures.

Viral-Like Diseases

Among the known diseases of major importance in Mexico is that called "Chronic Respiratory Disease" for which to date there are no immunization procedures. Treatment for this disease is based upon the injection of dihydrostreptomycin or terramycin. The tetracyclines are also used in the feed at levels of 200 to 400 grams per ton in serious outbreaks. In some cases, reports of unfavorable response to treatment is due to the fact that the air sac infection is of a different etiology than PPLO.

In the ornithosis group, the reported cases are extremely rare and no particular attention is given to these diseases.

Bacterial Diseases

Among the important bacterial disease problems in Mexico are pullorum, typhoid, other salmonellas, infectious coryza, fowl cholera, and colibacillosis. For many years it was common for poultrymen to vaccinate their flocks with mixed bacterins during the time of the year when these infections occurred. However, this practice is slowly disappearing. Most of the poultrymen know that the best method of avoiding problems with infectious coryza is the immediate eliminiation of sick chickens and not to permit the introduction of carriers. Many poultrymen not willing to apply rigorous hygienic practices treat their sick birds with sulfathiazole in the drinking water or sometimes using injections of penicillin and streptomycin, which only result in the perpetuation of the diseases in their flocks.

In recent months hatcheries have done much in reducing the incidence of pullorum and typhoid disease by accepting eggs only from disease free flocks, though at present these are commonly occuring diseases. The Federal Government has also begun a program to increase the number of breeding farms free of pullorum and typhoid reactors.

In cases where typhoid is present poultrymen treat their flocks by giving furazolidone for 21 consecutive days in the diet at 0.1 to 0.15% of the diet. Chloramfenicol is also used in the treatment of this disease. Some poultrymen also apply cholera-typhoid bacterin for the prevention of this disease. or when it has actually appeared, they apply the bacterin along with the furazolidone treatment.

During the last few years numerous cases of coliform infections (which have been isolated and classified serologically in the group of pathogens) appeared as primary or secondary infections in the respiratory or digestive system during viral or bacterial infections. Though the control of these infections is considered a serious problem without a complete solution, good results have been obtained in some cases by treatment with furazolidone, sulfathiazole, streptomycin at high levels, or other broad spectrum antibiotic. There have been various cases in which the water origin of the disease has been verified and subsequent treatment of the water has impeded the extension of coliform infection.

The incidence of cholera on modern poultry farms continues to diminish primarily because of better management and also the routine administration of antibiotics. In some parts of the country, when it is known that this disease is prevalent in the area, it is customary to vaccinate with cholera bacterin routinely. Though it is difficult to estimate the precise preventive action which vaccination with bacterins gives, many poultrymen are satisfied with this procedure. During active outbreaks of cholera, treatment generally given is the injection of procaine penicillin with strepomycin. Fewer poultrymen use broad spectrum antibiotics or sulfa base medications such as sulfaquinoxaline, sulfamerazine, sulfamethazine, sulfathiazole and sulfadiazine.

Internal Parasites

Of primary importance is coccidiosis and to such an extent that it is a general practice for feed manufacturers to incorporate coccidiostats in their diets for chicks. The most widely used coccidiostat is probably nitrafurazone; also, but widely used for preventive measures, is sulfaquinoxaline or nitrophenide mixtures. For treatment and control of coccidiosis satisfactory results are obtained with nitrofurazone in the feed or sulfaquinoxaline medications in feed or water.

With respect to the control of intestinal worms, in particular the ascarids, the use of piperazine compounds has given magnificent results.

AN INVESTIGATION OF THE COMMERCIAL POULTRY INDUSTRY OF THE UNITED STATES OF AMERICA—1956

A. G. BOLLEN, A. A. McARDLE and R. H. MORRIS

During 1956 the Australian Commonwealth Government arranged for the authors to visit the United States of America to survey the economic, technical and extension aspects of the commercial poultry industry. The following article is a summary of the full report presented to the Australian Government and published by the Commonwealth Bureau of Agricultrual Economics, Canberra.

The number of flocks of less than 200 birds in the U.S.A. is rapidly being reduced while larger flocks, i.e. those with more than 3,000 birds, are becoming more numerous. The total number of layers is falling but improvement in the lay per bird has allowed egg production to remain constant.

During the past twenty years the broiler industry has developed into one of the most competitive and efficient sectors of U.S. Agriculture; it has grown by 3,100% since 1934. Broiler chicken consumption has risen from ½ lb. in 1934 to 16 lb. per head in 1956.

In the U.S.A. the poultry industry is subject to a wider range of climatic conditions than in Australia. However, in the poultry producing areas of the State of California the climate resembles that of the various poultry districts of Australia and in general the management practices observed in California are applicable to our environment.

Considerable attention has been paid to reducing the amount of labour used, the main reason being not to lessen the number of hours worked but to increase the number of birds handled. Universities have conducted labour usage and time and motion studies on farms in an endeavour to find ways and means of reducing the amount of labour used for a given number of layers: as egg collecting, cleaning, grading and packing as well as feeding occupies approximately 80% of the time, considerable attention is being paid to these operations.

It has been shown that, given a well-organized plant, complete ready-mixed feeds handled in bulk automatic feeders and waterers, an operator can handle 2,500 layers. This includes the brooding of pullets from the day-old stage, egg gathering and packing.

Devices which are considered to save the greatest amount of labour are mechanical feeders, mono-rail carriers on deep litter farms, and the motorized trolleys used on wire cage farms. On some of the smaller farms light hand trolleys are

effectively used and are thought satisfactory for cage flocks up to 2,000 layers. The use of ready-mixed mash delivered in bulk to large feed storage bins is very common and considerably reduces labour on both egg and broiler farms. Large self-feeding hoppers which require replenishing weekly, although not used to any extent, may be the most economical type of feeder in terms of installation and operating costs for deep litter units.

In general the devices used depend upon the preference and the mechanical ability of the operator, the type of housing, feeding practices and the amount of finance available. There are, however, some labour-saving methods, e.g. collecting eggs directly into fillers, which do not involve any captial expenditure.

The availability of short-term credit is one of the factors mainly responsible for the rapid expansion of the broiler industry in the U.S.A. Broiler producers obtain day-old chicks, feed, medicines, fuel, etc. on credit from feed companies, hatcheries or processors who assume ownership of the birds, pay a contract rate for raising them and share profits with the growers. A similar type of financing is being used in some areas for egg producers, contracts being made for eggs of a certain quality.

The importance of farm record keeping is continually stressed in the U.S.A. and various simple systems are being used successfully. The farm budget approach has been used to advantage in one State, while in California management studies have been particularly useful.

In California co-operative poultry management studies have been conducted since 1925. The primary purpose is to help the co-operating farmers to keep the records necessary for improving their management practices. Apart from this immediate value, the material obtained is most useful to allied industries.

The profitability of egg production varies from year to year, but a steady increase in flock size has helped greatly in providing a satisfactory return to management. In the highly competitive broiler industry, with narrow margins between costs and returns, the profitability to the farmer depends largely upon the type of contract with the organization providing the credit for working expenses.

Extension services are financed by federal, state and county governments and controlled by the land grant col-

leges or universities. The methods used by poultry extension officers are similar to Australian practice, and in addition television is employed. Major research projects are submitted to a federal controlling committee for approval so as to avoid duplication of work.

Conferences, conventions and internal departmental schools are common. They are of considerable value in pooling knowledge and are an important aid in the progress of the industry.

White Leghorns are the main egg-producing breed. The franchise system is in operation; hatcheries are being absorbed by the large breeding organizations so that their number but not the number of chickens is reduced. These large organizations produce highly inbred lines at great cost and supply the franchise hatcheries with breeding stock. The chickens are sold according to grade with a reduced price for summer-hatched birds, and emphasis is placed on the high-level replacement of stock each year.

Breeding authorities indicated that crossing between hatchery lines was advisable and that the necessary genetic material was present in Australia, together with the geneticists, to bring about improvement in stock production levels.

Random sample testing is regarded as a valuable aid to efficiency in the U.S.A. in that it provides a sound basis for the proving and the spreading of stock from the best sources. Stress is being placed on the need to use replicate pens for testing the layers and those placed above a certain level of production are listed equally, the emphasis being on those which stay in this group for three years. Thus insignificant differences do not determine the winning positions.

The use of prepared feed rations and bulk methods of feed distribution has reduced labour requirements. Rations are completely balanced in all respects, and the costs are comparable with those of mixing them on the farm. They are principally of the high-energy type for layers as well as for meat-producing birds, being composed almost entirely of crushed grains suitably balanced for protein, etc. High-grade lucerne meal is produced on a large scale and included in poultry feeds in place of the daily distribution of green feed so that the yolk colour of the eggs may not be lost.

American poultrymen are well aware of the important part played by rearing on the laying performance of the adult bird. Chickens are raised either on deep litter, wire or open range conditions, depending upon the facilities available. It

is usual on many farms to rear four or five broods each year.

In southern California about 90% of the production is from cage farms, whereas deep litter farms predominate in the northern area of the State.

The main aspects of deep litter and cage systems are discussed at length in Part XIII but no definite conclusion can be reached as to their comparative advantages. It is the opinion of the University of California, which has had every opportunity to compare their relative merits, that the prospective poultry farmer will be guided by such factors as climate, proposed location and above all by his personal preferences. Properly managed, both systems were considered to be satisfactory.

The methods of cleaning eggs in U.S.A. are not suitable for Australian requirements. However, the operation of some types of storage, e.g. egg rooms built into the ground, evaporator-type water-cooling systems and air-conditioned units, is very efficient. The use of cartons for marketing, the packing of eggs of uniform shell colour, and refrigerated retail facilities have stimulated egg sales, as has the advertising scheme promoted by the Poultry and Egg National Board. Eggs and meats are sold on the open market.

Advances in the knowledge of feed ration formulas and the improvement of breeding by meat bird crosses have both played their part in developing the present-day American broiler bird, with its improved ratio of feed used to meat produced. The higher energy rations have been enhanced by the addition of stabilized fats, synthetic acids and vitamins, together with antibiotics. The increased popularity of broilers has been encouraged by the comparatively high prices of red meat.

Turkey production practices are similar to those used in Australia, but greater use is made of intensive methods. Ducks are raised extensively on pelletted feeds; otherwise similar husbandry methods apply. Geese are raised extensively for the weeding of certain crops and both breeders and goslings are fed on similar rations to those used for turkeys.

The incidence of disease is high and considerable labour is involved in vaccination. Leading authorities stressed that importation of stock from the U.S.A., even with provisions for quarantine, would be very unwise in view of the freedom of Australia from Newcastle Disease.

THE POULTRY INDUSTRY IN PUNJAB, INDIA— ITS PAST, PRESENT AND FUTURE

AMAR SINGH MANN*
Patiala Gate, Sangrur, Punjab, India

Punjab is a state situated in the foot of the Himalayas in India. It was composed of many small states which were merged after partition. Now the state has an area of 47,497 square miles with a population of 16,134,890 people. Sixty six percent of the population is engaged in agriculture. Wheat, cotton, corn, barley and gram are grown in this area. The Punjab has extremes of climate. The temperature may go as low as 40 degrees Farenheit during winter nights to as high as 115 degrees Farenheit at noon in summer. The people in this area are very hardy and are good farmers. The Punjab is a surplus grain area.

Typical small poultry houses in Punjab. The walls are made of kiln brick covered with plaster. The roof has a bamboo frame thatched with hay.

A large percentage of the people live in villages composed of 35 to 1000 families. Poultry is commonly kept in the villages to meet the daily requirements of the farm families. It is not kept for farm income. Chicken meat in Punjab is a delicacy and is now common with all people at all festive occasions. Usually poultry is allowed to move freely in the houses in which the people live and house refuse is generally fed. Broody hens are used for hatching and brooding. The roosters are allowed to run with the hens all the year round. The villagers are still of the opinion that the hens will not lay without the roosters.

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* Former manager of the Malerkotla Demonstration Farm. Participant for higher studies under the O.S.U.—I.C.A. Contract with headquarters at Ohio State University, U.S.A.

Professor E. L. Dakan (on the left) from Ohio State University, U.S.A. (center) Manager of the Gurdaspur Poultry Farm, and Sadar Harbhajan Singh (right), Poultry Development Officer, Punjab.

Desi fowl, a descendant of the original wild fowl found in the Himalays, is the most common chicken. These fowl have been crossed and mixed with other fowl in India as well as with those which have been imported from other parts of the world from time to time. These native birds are light in weight and resemble somewhat the Leghorn with mixed colors. They have red earlobes. Although the wild fowl have a color similar to that of the Brown Leghorn, Desi fowl as a result of mixing with other breeds, have almost all colors; e.g., white, black, gray, brown and red. These birds still retain the body shape of the jungle fowl, *Gallus bankiva*.

The other common native breed in the Punjab is the Aseel. This breed was probably brought from the State of Hyderabad—another state in the midsouth of India. For centuries this breed has been kept for cock fighting. They are large, broad-breasted, closely feathered birds. Usually their eye color is pearly grey but some have either brown or black eyes. There are many varieties of Aseels: e.g., white, black, brown and mixed colors. The gypsies (called Bazigars) who travel from place to place on donkeys or bullock carts still

use these birds for cock fighting and own good specimens of the breed.

During world war II twenty two poultry farms were opened in India scattered all through the country. These farms were opened to meet the demands of hospitals and officers messes in the army. Electric operated, forced draft, incubators and hatching eggs were imported from England to run these farms. Some of these farms had a capacity of rearing nearly 20,000 birds. Brooder houses were built with little or no cross ventilation. They were concrete and wood structures. Chickens were brooded in confinement but the layers were kept on range. Each 100 birds were provided a grassy run of 100 x 200 ft. with a night house 20 x 20 ft. and 8 ft. high. After world war II these farms were closed.

The State has one research farm situated at Gurdaspur. There are other small demonstration farms at Ambala, Jullundur, Malerkotla, Nabha and Bhatinda. All of these are state financed. Free education is provided at these farms to farmers interested in poultry. Eggs and poultry stock are available for sale at these farms. Technical advice is imparted to all interested in this industry.

There is no difficulty in housing. Simple houses supported by poles with thatched roofing can serve the purpose well in this area. There is no scarcity of grains in this area. Peanut oil meal and mustard oil cake meal are common sources of vegetable protein feeds. Fish meal and meat offal are available as animal proteins. Berseem and lucerne are used as succulent green feeds for poultry.

A row of poultry houses with brick construction with asbestos sheets for roofing.

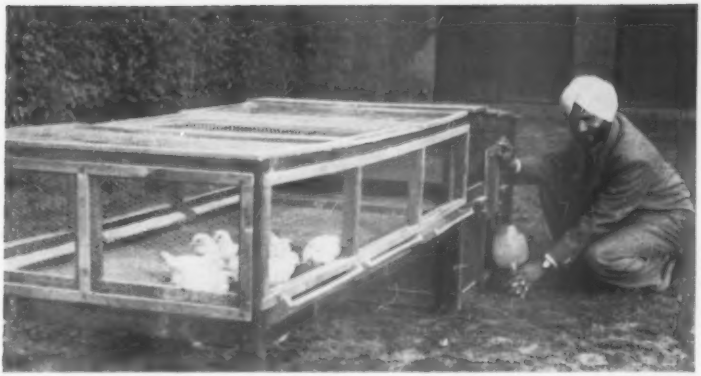
Newcastle disease was first noticed in Ranikhet in the Nainital District in the United Provinces in India. Therefore, Newcastle disease is termed Rhanikhet disease in India. It is prevented by vaccination. Vaccines for fowl pox and Ranikhet disease are manufactured by the Biological Products section of Veterinary College at Hissar in the Punjab. Free vaccination is arranged by the State Veterinary Department through their veterinary assistants in charge of each veterinary hospital. These hospitals are situated in big villages, towns and cities. Sulpha drugs and antibiotics manufactured by British and American firms are available in the country.

As much of the country is tropical there is much difficulty in eradicating ticks (*Argus persicus*) from the poultry houses. Tick fever or spirochaetosis is very common. Benzene hexachloride is commonly used to eradicate ticks. Intestinal worms as tape and gape worms are also known to infest birds because they are still raised on ranges in the Punjab.

A member of the Young Farmers Organization with his precious White Leghorn cockerel.

Young Farmer's Clubs have been organized in the villages to impart interest in poultry farming to young folks. These club are working on the pattern of 4-H clubs in U.S.A.

Thirty thousand chicks and 15,320 hatching eggs have been received in India from U.S.A. on February 17th, 1957. (WPSJ. 13 (2) :136-138) under the Technical Cooperation Mission program. A part of these will be used as a breeding nucleus for these demonstration farms in the Punjab.



Sadar Harbhajan Singh, Poultry Development Officer, demonstrating the use of a kerosene household lamp for heating a portable brooder.

Improvement of poultry is a part of the program under the Second Five Year Plan of the Government of India. Additional demonstration farms will be opened in other areas of Punjab. Each farm will be located at a place nearest the centre of a group of villages. The villagers will receive 400, five month old pure bred White Leghorn or Rhode Island Red stock for the improvement of their Desi fowl. These birds will be supplied at reduced prices. Free prophylactic vaccinations will be arranged by the person in charge of these centrally located demonstration farms. Farmer's eggs will be hatched at these Centres at low rates. At these Centres villagers will be trained in improved methods of poultry keeping. Poultry exhibitions will be arranged at local fairs, where prizes will be awarded to the winners. Financial aid to start new farms in villages will also be available to interested farmers under this plan. Electricity from the World's largest Bhakra Dam will be available to the farmers at low rates.

If refrigeration facilities are available; if cooling ceiling fans and water sprinklers are used to cool birds in open houses in the summer; if common pests are eradicated; and if feeds are available at low costs, there is every hope of a bright future for the poultry industry in this area.

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IAN MACDOUGALL

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F. A. O. POULTRY PRODUCTION CONFERENCE FOR N. AFRICA AND THE MIDDLE EAST.

Cairo, December, 1957

Early in December 1957 the F.A.O. sponsored a Conference at Cairo to consider poultry production problems in North Africa and the Middle East. The Egyptian Government acted as host, and the sixty or so delegates attending came from the Mediterranean seaboard of Africa and from several Middle East countries. The Secretary and convenor was Dr. Engler—the Poultry Specialist of the F.A.O. and a Vice-President of the W.P.S.A. Dr. R. Coles, the president of the Association, was present as Poultry consultant to the F.A.O. through the Association's representative status with the F.A.O.

The chief problem confronting the conference was the possibility of expanding the poultry industries in the region in order to provide both an improved human diet and a source of income through promoting a poultry export trade. While recognising that the fowl was capable of regenerating its species with great celerity, the conference fully appreciated the difficulties with which the delegate countries would be faced. Among the foremost was the lack of technical knowledge by villagers and the failure to appreciate the nutritional requirements of the high laying hen. The risk of heavy losses from disease through introducing high grade stock bred in a vastly different environment gave rise to extensive discussion. And the alternative of upgrading local strains received a fair measure of support.

Not the least of the problems was that of finance—the difficulty the villagers would have in buying batches of chicks, while government officials present were well aware that a free distribution would really need extra expenditure on advisory staffs to ensure that such a large scale investment should ultimately prove beneficial to the country.

Among the more technical problems were those of employing locally available foodstuffs and the type of housing to be used. The former brought forward a number of interesting papers from delegates and it was clear that further experimental work is needed which may be extremely rewarding. The discussion on housing emphasized the range of climatic conditions in the region and stressed the limitations in our knowledge of avian physiology.

Apart from one day visiting a number of government poultry breeding centres the rest of the week was devoted to discussion on the major problems cited. As a consequence the conference made a number of recommendations and conclusions as follows:

Status of the Poultry Industry and Programs for Improvement

Having recognized the great value of eggs and poultry meat in improving human nutrition, as a major source of income to the farmer, and the rapidity compared with other species of livestock with which improvements in poultry husbandry can be secured in localities where the status of poultry production is low:

(1) Poultry production should be recognized as an important section of agriculture and this should be urged upon the authorities and organizations charged with the administration of agricultural policies in the countries concerned in order to take appropriate action for the development of the poultry industry.

(2) The obvious advantages accruing where the policy on poultry development is directed by, and under the supervision of, one single directing organization should be stressed. The function of such an organization would be to coordinate the activities of the various bodies concerned in the poultry industry. It is also urged that greater attention should be directed to the collection of poultry statistics in order that the rate of progress can be determined and, where necessary, the need for greater effort to improve the industry.

Improving Poultry Production through Breeding

(3) Further studies to be made of the genetic capability of native breeds under good management conditions in order to distinguish those strains capable of speedy improvement.

(4) Where native stock is shown to possess a high or moderate potential for production a policy of selective breeding should be followed.

(5) Where native stock is shown to possess a low genetic potential for utility factors, selective breeding is too slow a process and improvement should be sought by the introduction of high grade stock in order either to improve through mating with local breeds or replace existing flocks. This should be carried out in the early stages by governments. As soon as possible reliable non-government organizations and private individuals should collaborate in the execution of approved national poultry improvement plans.

(6) In order to save time both policies, that is importation and selection from native stock, should be carried out concurrently.

(7) Reasonable management must be assured if these attempts to upgrade poultry stocks are to be economically sound. The difficulties in connection with village management must be fully realized if a policy of introducing foreign breeds is to be adopted.

Improving Egg and Poultry Meat Production through Better Housing and Management

(8) For demonstrational purposes functional housing should be constructed from local materials which can economically provide housing requirements which protects from heat and strong winds, as well as allowing for efficient ventilation.

(9) Greater emphasis should be placed on the establishment of demonstration poultry stations for practical training and experience in poultry management for students in agricultural schools.

(10) More experimental work should be carried out in the region on poultry housing and management systems.

Improving Poultry Production through Feeding

(11) Poultry nutrition should be recognized as one of the most important factors in poultry production and due consideration should be given to nutrition in all its aspects.

(12) The need for the establishment of efficient feed industries and the manufacture and distribution of compound feeds to comply with governmental rules and regulations should be stressed in order to supply the poultry producer with suitable and known feedstuffs and thus obtain higher profits in growth and egg production. Feeds of local origin should receive major attention.

(13) Governments concerned should stress the need for and encourage the inclusion of animal protein, vitamin supplements and other additives in mixed feeds in order to produce well balanced rations. In this respect Governments should consider making available such constituents through such methods as: Installing meat meal and blood meal production plants in abattoirs, encouraging the production of locally made fishmeal, establishing green fodder dehydration plants or by making funds available for imports of products which cannot be locally produced.

Prevention of Losses—Control of Diseases and Parasites

(14) Disease control programs taking into account the local conditions should form an essential part of any poultry development plan. Sufficient numbers of veterinarians and technicians with special training on poultry disease should be made available for the control of poultry diseases. Adequate facilities including laboratories for investigation, diagnosis and safety and potency test of vaccines, field and laboratory equipment, supply of medicine and biological products and transport must be provided.

(15) Improvement of hygiene and good management should be emphasized as they are indispensable for the efficient prevention and control of diseases.

(16) A nation wide vaccination program against Newcastle disease, fowl pox, spirochaetosis and if necessary fowl plague and the control of pullorum disease, coccidiosis and internal and external parasites are important steps in a program to reduce disease losses.

(17) Further survey and investigation of poultry disease problems should be undertaken by the governments. Quarantine measures and other provisions should be taken to prevent the introduction of new diseases into the region which may occur particularly through the importation of poultry and poultry products.

(18) Close cooperation between the countries of the region in the prevention and control of infectious diseases, the preparation and supply of vaccine and other biological products and the exchange of technical information and incidence of diseases be maintained with a view to facilitating the control of the diseases in the region.

(19) Veterinary colleges should pay more attention to poultry diseases in their curricula for the graduate and post graduate courses.

Processing and Preservation of Eggs and Poultry Meat.

(20) Programs of research in poultry should take account of the technical problems which arise in the successful preservation of eggs and of poultry meat. An important aim of any investigations undertaken should be to train people so that, by a study of local conditions, they may be able to apply successfully to the developing poultry industries the technical knowledge on preservation which already exists.

(21) The importance of using extension services to instruct farmers in the proper care of eggs on farms should be emphasized.

Institutions, Services and Marketing

(22) Steps should be taken to introduce national poultry improvement plans in member countries in order to assist farmers to obtain healthy and productive stock.

(23) It should be the aim that commercial undertakings should eventually take over the task of distributing chicks although at the outset, leadership in this field may need to be assumed by governments.

(24) When the status of the poultry industry improves, the installation of testing stations, supervised by governments, should be considered in order to estimate the value of stock sold by commercial suppliers.

(25) Governments should make provisions for suitable training facilities in poultry husbandry with the intention of training personnel for both work on farms where advanced techniques are applied and for practical extension work at the village level. These courses should be of about one year's duration and equal emphasis should be given to practical work and theory. Poultry husbandry should be included in the curricula of Veterinary and Agricultural colleges and Agricultural Schools.

(26) Extension workers should receive training in poultry husbandry and the emphasis should be on practical work. If possible, specialists should be appointed to advisory service headquarters.

(27) The extension workers should work in close collaboration with teaching and research centres in the interests of keeping the latter informed of problems arising in the field, and the former in touch with new scientific developments.

(28) The formation of associations and cooperatives should be encouraged as a measure designed for the protection of the poultry producers in any marketing venture and to assist them in the purchase of feedstuffs and equipment.

(29) In order to prevent losses chicks should travel under conditions equivalent to first class airmail.

REVIEW OF POULTRY PUBLICATIONS

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(*Abstracts from Animal Breeding Abstracts* and from *Nutrition Abstracts and Reviews* are reproduced by arrangement with the Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England.

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GENETICS

ABBOTT, U. K., and **ASMUNDSON, V. S. 1957.** (Dep. Poult. Husb., Univ. California, Davis.)

SCALELESS, AN INHERITED ECTODERMAL DEFECT IN THE DOMESTIC FOWL. *J. Hered., 48:* 63-70.—The "scaleless" mutation, *sc*, was first observed in a flock of New Hampshires at Davis, California, in 1954. In scaleless chicks the major feather tracts are completely bare of down feathers. The few feathers present occur principally in the head tract, but there are also some in the femoral, crural and caudal tracts. Scales and spurs are absent, and although the skin on the under surface of the foot is folded as in foot pads, it remains smooth. During the growing period the mutant birds become even more naked. In adults the head is practically bare and the few feathers present on the body are small and abnormal in structure. The defect is apparently due to an autosomal recessive gene with full penetrance.

The scaleless (*sc*) phenotype is fully viable during embryonic life. Although scaleless birds do not survive long under natural rearing conditions, they will live if kept in a suitably warm environment. Adult ♀♀ are hardier than adult ♂♂. The rate of egg production and the percentage of hatchability are lower than normal and the eggs vary in size, shape and shell quality. (Animal Breeding Abstracts)

AMER, M. F., H. M. EL-IBIARY, S. S. KHISHIN, and **H. F. ISSAIVI.** 1957. (Department of Animal Production, Faculty of Agriculture, University of Ein Shams.)

A COMPARATIVE STUDY OF EGYPTIAN STRAINS OF CHICKENS AND THREE STANDARD BREEDS IMPORTED FROM HOLLAND. I. FERTILITY, HATCHABILITY, AND CHICK MORTALITY. *Reprint from Alexandria Journal of Agriculture, Research Vol. V.—July 1957—No. 2.*

BARONAVSKAJA, T. I. 1957. Zavisimost inkubacionnyh kačestv jaic ot vozrasta kur i petuhov.

THE RELATION BETWEEN THE INCUBATING CHARACTERS OF EGGS AND THE AGE OF HENS AND COCKS. *Izv. Timirjazev. sel.-hoz. Akad., 1957 (1):* 161-164.—Data were obtained from Leghorns in

1950-53. The percentage of fertile eggs decreased with the increasing age of the ♂: 91.6% were fertilised by ♂♂ in their 1st yr., 94.5% by ♂♂ in their 2nd yr. and 61.6% by ♂♂ in their 5th yr. Fertility also decreased with increasing age of dam from 96.1% in the pullet year to 91.8% in the 3rd yr. Hatchability of fertile eggs and of eggs set decreased with increasing age of the hen. Hatchability was not directly related to the age of the ♂. Figures are tabulated to show fertility and hatchability percentages of eggs laid by hens of different ages mated with cocks of different ages. (Animal Breeding Abstracts)

COLES, R. 1957. (Minist. Agric. Fish Food, London.)
FURTHER STUDIES ON THE SEX RATIO IN FOWL. *Emp. J. exp. Agric., 25:* 207-218.—The data recorded in this investigation support the earlier conclusions [*see A.B.A., 25,* No. 427] that with purebred pullets more ♀♀ than ♂♂ are produced at fertilisation. It seems that older ♀♀ *in continuous lay* tend to show a still wider primary sex ratio. While this experiment did not manifest a significant difference between pullets and hens, the same tendency was observed in previous years and in another flock where similar details on sex ratios have been recorded. The primary sex ratio does not show such a marked departure from parity among the offspring of crossbred stock—at any rate for pullets, and it does appear that the effect of crossbreeding may offset the apparent widening of the sex ratio with continued laying.

The incidence of greater ♀ than ♂ embryonic mortality with low hatching rates was not so manifest in this investigation as in earlier experiments although this general conclusion has been reached by other workers. There does, however, seem to be a tendency for ♀ embryos from purebred parents to succumb more easily than ♀ embryos from parents crossbred. No convincing reason can be put forward for the inequality of the primary sex ratio although, in view of the tendency for this inequality to increase with continued high-level laying, it is tentatively suggested that the reason may be the influence of some endocrinal activity related to the ovarian tract. The possibility of the blood *p*H of the ♂ influencing the primary sex ratio is discussed, although the widening of that ratio with laying continued into the 2nd yr. would suggest that the ♀ does exert some influence whether or not the influence of the ♂ is a major consideration.—From author's summary. (Animal Breeding Abstracts)

COLES, R. and **F. CUMBER.** (Ministry Agric., Fisheries and Food, London.)
THE RELATIONSHIP BETWEEN FERTILITY, HATCHABILITY AND MORTALITY IN FOWL. *Brit. Vet. Jour. 112(11):* 491-496. 1956.—Data on progeny of a flock of 100 over a period of 7 years exhibited no relationship between infertility, low hatchability and juvenile or adult mortality. (Biological Abstracts)

CURTO, G. M., and **G. VECCHIOTTI.** 1957. (Ist. Zootec. Gen., Fac. Agrar., Milan.) Su di un ibrido fra pollo e faraona.
A HYBRID BETWEEN THE DOMESTIC FOWL AND THE GUINEA-FOWL. *Riv. Zootec., 30:* 145-147.—The hybrid, apparently the product of a Leghorn cock and a guinea-hen, is described and illustrated. The presence of testes provided the only indication that it was a ♂. Histological examination showed no spermatogenesis beyond the stage of primary spermatocytes. (Animal Breeding Abstracts)

EL-AYADI, MOHAMED N., and **HUSSEIN M. EL-IBIARY.** 1957. (Department of Animal Production, College of Agriculture, Alexandria.)
VARIATIONS IN FERTILITY AND HATCHABILITY OF BALADI AND LEGHORN EGGS. *Reprint from Alexandria Journal of Agriculture, Research Vol. V*—July 1957—No. 2.

FARNSWORTH, G. M. (Jr.), 1957. (Dep. Poult. Husb., Iowa State Coll., Ames.)
ESTIMATES OF GENETIC PARAMETERS INFLUENCING BLOOD SPOTS AND OTHER ECONOMIC TRAITS OF THE FOWL. *Abstr. Doct. Thesis No. 1762* (1956). *Iowa St. Coll. J. Sci., 31:* 406-407. —The purpose of the study was to determine to what extent genetic and environmental factors influence blood spots, rate of annual egg production, March egg weight, and age at sexual maturity. Hatch effects on blood spots and March egg weight were small; they were of greater importance in the case of the other 2 traits. Heritability was estimated to be 32% for blood spots, 34.8% for egg production, 39.8% for sexual maturity and 51.4% for egg weight. All phenotypic correlations between the 4 traits were essentially zero, with the exception of that between annual egg production and sexual maturity. The genetic correlations indicated that birds which produce the largest number of eggs and mature earliest produce eggs that have a higher percentage of blood spots, that birds having the higher rate of lay tend to lay smaller eggs, and that early-maturing birds average heavier eggs. (Animal Breeding Abstracts)

FISCHER, H. 1957. (Inst. Anim. Husb., Univ. Indonesia, Bogor.)
"SILKY", A FEATHER ANOMALY IN THE FOWL. *Hemera zoa, 64:* 163-165. [Also Indonesian text.]—"Silky" is a condition of the feathers of fowl and pigeons in which the barbules are hookless. In the fowl it appears to be due to a single autosomal recessive mutation, while in the pigeon it occurs as an autosomal dominant. Silky fowls are not uncommon in Indonesia, especially on the island of Java. The mutation was described and illustrated by Aldrovandus as early as 1600. Silky fowls kept at the Institute of Animal Husbandry, Bogor, for demonstration and experimental work are not inferior in performance to normal birds of the same breed. (Animal Breeding Abstracts)

HARRISON, J. R. 1957. (Dep. Zool., Miami Univ., Oxford, Ohio.)
MORPHOGENESIS OF CHICK EMBRYO *IN VITRO* AFTER EXPOSURE TO LOWER TEMPERATURE *IN OVO*. *Physiol. Zoöl., 30:* 187-197.—The morphogenetic effects of exposure of White Plymouth Rock eggs to a lowered incubation temp. (25° C.) for 10-14 days prior to incubation at normal temp. (37.5° C.) are described. Genetic variability was observed between individual blastoderms in degrees and rate of degeneration. Although there was, in exposed eggs, a decrease in potency to form normal embryos, the retention of anv potency indicated the ability to reverse the effects of low temperature. The nervous system was more sensitive to low temp. exposure than was the circulatory system. (Animal Breeding Abstracts)

HENDERSON, E. W. 1957. (Dep. Poult. Husb., Michigan State Univ., East Lansing.)
HATCHING POWER OF PUREBRED vs. CROSSBRED CHICK EMBRYOS. *Quart. Bull. Mich. agric. Exp. Sta., 39:* 570-577.—In trials in which 128 pedigreed hens of several breeds were mated successively, with suitable intervals, to 2 or more ♂ ♂, 1 of which was the same breed as the hen in 92 cases, it was found that hatchability was slightly less in the interbreed matings (85 *v.* 88%). It was confirmed that hatchability is influenced more by the hen, in the type of egg she lays, than by the cock. (Animal Breeding Abstracts)

LUBNOW, E., 1957. (Zool. Inst., Univ. Bonn.) Die Pigmentierung des japanischen Seidenhuhns.
THE PIGMENTATION OF THE JAPANESE SILKIE FOWL. *Biol. Zbl., 76:* 316-342. [B.]—The Japanese Silkie fowl usually has white plumage, although birds with pigamented feathers are also found. The breed is characterised by the dark (often black) coloration of much of the interior of the body, particularly the collagen fibers. The eyes are dark brown. The eggs are brownish and smaller than those of Leghorns.

The chicks have yellow or yellowish-brown down. The pigmentation of the internal tissues is not related to feather pigmentation. The presence of colour is determined by the dominant gene, *P*, while the intensity of pigmentation is determined by a sex-linked half-dominant gene, *D* (dilution). *P* and *D* are inherited independently.

A study was made of melanocyte migration and pigment distribution in White-feathered Silkie fowls. The findings are compared with data obtained from similar observations on Brown Leghorn and Chabeau fowls. (Animal Breeding Abstracts)

McCARTNEY, M. G., V. D. CHAMBERLIN, and **J. W. WYNE.** 1956. (Ohio Agric. Exp. Sta., Wooster.)

TURKEY STRAINS ARE COMPARED FOR REPRODUCTIVE PERFORMANCE. *Ohio Fm. Home Res., 41:* 93-95.—Of the 10 strains previously compared for meat production [*see A. B. A., 24*, No. 1888], six, representing Bronze, Large White and Small White breeds, were selected and compared for reproductive performance over a total period of 172 days, each strain being represented by 24 ♀ ♀. The results are tabulated. Average egg production for a 90-day period ranged from 34.1 in the Wahkeen to 43.9 in the Beltsville strain; broodiness varied from 36.7% in the Beltsville to 91.6% in the Nicholas and Thompson strains; av. number of poults per ♀ over a 56-day period was highest in the Beltsville (19.5) and lowest in the Lovelace strain (10.1). (Animal Breeding Abstracts)

OREL, V., F. MUSIL, and **V. ZNOJILOVA.** 1957. (Centr. Agric. Res. Inst., Brno.) Zavisimostj mezdu okraskoi zeltka i nekotorymi svoistvami jaic

RELATION BETWEEN YOLK COLOUR AND SEVERAL EGG CHARACTERS. *Pticevodstvo, 7 (5):* 33-35. — Correlations were found between yolk colour and (*a*) shell weight ($r = -0.14$), (*b*) shell thickness ($r = -0.08$), (*c*) loss in weight after storage for 24 hrs. at 20° C. ($r = +0.07$), (*d*) shell porosity (—0.05). In white- and brown-shelled eggs there were correlations between the appearance of the yolk at candling and (*a*) yolk colour ($r = +0.29$ and $+0.22$ resp.), and (*b*) the colloid content of the yolk ($r = +0.24$ and $+0.17$ resp.). In eggs with white shells the appearance of the yolk at candling was correlated with loss in weight ($r = +0.40$). (Animal Breeding Abstracts)

OREL, V., F. MUSIL, and **V. ZNOJILOVA.** 1957. (Inst. Meat milk, Prague.) Vliv seleckce nosnic podle jakosti vajec na produktivitu nosnic a vztahy mezi jednotlivymi technologickymi vlastnostmi vajec.

THE EFFECT OF THE SELECTION OF HENS FOR EGG QUALITY ON EGG PRODUCTION, AND THE RELATIONS BETWEEN THE VARIOUS EGG CHARACTERS. *Sborn csl. Akad. Zemed. Ved, Zivoc. Vyr., 2(35):* 479-492. (Animal Breeding Abstracts)

ROBINSON, L. 1957.

A CONDUNDRUM. *Poult. Ind., 22:* 440.—Surprising results have been obtained at the National Institute of Poultry Husbandry [Newport, Shropshire] when a recently established strain of Silver Leghorns [*see A.B.A. 25*, No. 1501] was mated with the other breeds. With Buff Rock cockerels, 100% sex linkage was obtained, but not with Rhode Island Red cocks. When crossed with Sumatra Game ♂ ♂, Silver Leghorns produced white chicks spotted with black, instead of black chicks as was expected. Further test matings are being made. (Animal Breeding Abstracts)

ROWELL, J. G. (U. Cambridge, Eng.) and **D. M. COOPER.**

THE RELATION BETWEEN FERTILITY IN THE FOWL AND THE DILUTION RATE OF THE SEMEN USING A GLYCINE DILUENT. *Poultry Sci. 36(4):* 706-712. 1957.—The effect of diluting fowl semen on its fertility was investigated in an experiment involving 180 hens. The diluent used was glycine mixed with glass distilled water, the

concentration being 12.5 mg/ml. of diluted semen; the dilution rates were 0, 1:1.5, 1:2.25 and 1:3.38 (the logarithms of these are equally spaced). Fertility (transformed from percentages to angles) decreased linearly as the rate of dilution increased, and the rate of decrease was the same for each of 6 collections. Results of this and previous experiments suggest that the principal cause of decreasing fertility with increasing dilution rate is the decreasing number of spermatozoa inseminated: ratio of diluent to seminal plasma has some effect depending on the diluent. Only small increases in fertility can be expected if more than 170 million live spermatozoa are inseminated.—*J. G. Rowell.* (Biological Abstracts)

RUUS, C. H. 1957. (Estonian Agric. Acad.) Izmenenija jaicenoskosti u gusei v zavisimosti ot cikličnosti jaicekladki.

CHANGES IN EGG PRODUCTION OF GEESE IN RELATION TO THE LAYING CYCLE. *Pticevodstvo, 7 (5):* 19-21. — Data were obtained in 1954-55 on the flock of 500 geese, the majority of which were crossbreds, at the State Farm Luunjja in Estonia. Production averaged 22.2 eggs. 17.7% of the geese had 1-day laying cycles and produced an average of 11.7 eggs; 38.9 and 27.1% had 2- and 3- to 4-day cycles resp. and averaged 18.2 and 23.3 eggs; 11.3% had 5- to 6-day cycles and averaged 29.4 eggs. The av. interval between cycles decreased from 36 hrs. (29.0-42.5) in March to 25.3 hrs. (12.0-34.0) in June. Average egg weight decreased from 178.8 g. in March to 163.9 g. in May and hatchability from 71.4% of 784 eggs in March to 61.5% of 1290 eggs in May. (Animal Breeding Abstracts)

TARABRINA, L. G. 1957. (Dep. Poult. Breed., Timirjazev Agric. Acad.) Vozrastnye i sezonnye izmenenija kačestv jaic kur-molodok.

QUALITATIVE CHANGES DUE TO AGE AND SEASON IN PULLETS' EGGS. *Pticevodstvo, 7 (7):* 38-40.—Yolk, albumen weight and chemical composition, and shell thickness and porosity were ascertained in the eggs of pullets of the Russian White breed and of the Moscow breed group in 1954-55. In addition to considerable individual variations there were breed differences in the relation between yolk height and diameter, in albumen density, and in shell thickness and porosity. It is concluded that the morphological structure of the egg and its chemical composition are affected by age of pullet, period of production, season and ration. (Animal Breeding Abstracts)

VOLKOV, D. I., N. E. GORODKOVA, A. G. NAHLUPINA, and **SAPOVALOV, Ja. Ja.** 1957. (All-Un Poult. Breed. Res. Inst.) Novaja porodnaja gruppa kur obščepoljzovateljnogo tipa—kučinskie jubileinye.

A NEW BREED GROUP OF FOWL OF THE GENERAL PURPOSE TYPE—THE KUCHIN ANNIVERSARY. *Pticevodstvo, 7 (6):* 19-23.—To mark the 25th Anniversary of the Kuchin State Farm for Poultry Breeding in 1954, a new breed group of fowl developed there was named the Kuchin Anniversary. Plymouth Rocks, New Hampshires, Rhode Island Reds, Australorps, Leghorns and Livnys were crossed, and in 1954 the 7th generation of birds from *inter se* matings was hatched. The av. body weight of ♂♂ and ♀♀ is 3.8 and 3.0 kg. resp. The ratio of bone to muscle is 1 : 3 for ♂♂ and 1 : 6.04 for ♀♀. Young are killed at 3-4 mths. when body weight is 1542-2299 g. for ♂♂ and 1205-1681 g. for ♀♀. Production over 5 yrs. averaged 175 eggs; it continues throughout the year, an average of 19.8 being laid in Sep.-Nov. and 41.5 in Dec.-Feb. At collective farms production averages 112-127 per year. The fowls have a small head with a leaf comb, and a deep wide body with a well-developed breast. Chicks have reddish-brown down with light patches, hens are light red with a dark brown head and dark flight feathers and rectrices, and cocks are red with a black breast and yellow head. They are bred in several provinces and are also being used for crossing with a number of breeds. (Animal Breeding Abstracts)

ZWILLING, E. 1956. (Storrs Agric. Exp. Sta., Storrs, Conn.)
GENETIC MECHANISM IN LIMB DEVELOPMENT. *Cold Spr. Harb. Symp. quant. Biol., 21:* 349-354. Discussion: 354.—From the results of experimental manipulation of limb bud ectoderm and mesoderm from genetically normal chick embryos and from embryos carrying polydactylous (*Po* or Po^d) or wingless mutants, it is concluded that some factor resident in limb bud mesoderm is affected by these mutants. There is a possibility that a mutant such as "wingless" may produce its effect via a genetic interference with some cell-to-cell relationship. (Animal Breeding Abstracts)

PHYSIOLOGY

BIERI, J. G., C. J. POLLARD, and **G. M. BRIGGS.** (U. S. Dept. Health, Education, and Welfare, Bethesda, Md.)
ESSENTIAL FATTY ACIDS IN THE CHICK. II. POLYUNSATURATED FATTY ACID COMPOSITION OF BLOOD, HEART AND LIVER. *Arch. Biochem. and Biophys. 68(2):* 300-307. 1957.—The polyunsaturated fatty acids in plasma, liver, and heart of chicks were determined at intervals during essential fatty acid deficiency. The marked decreases in dienoic and tetraenoic acids, and increase in trienoic were partially corrected by feeding methyl linoleate. The evidence indicates that dienoic acid is converted to tetraenoic and pentaenoic acids, and possibly also to hexaenoic acid.—Auth. summ. (Biological Abstracts)

IWAMURA, I., N. MURAI, and **T. HIDAKA.**
ON THE STRUCTURE OF EGGS. 2. DISTRIBUTION OF FREE AMINO ACIDS IN THE FRESH HEN'S EGGS AS DETERMINED BY PAPER CHROMATOGRAPHY. *Bull. Fac. Agric. Univ. Miyazaki,* 1957, *2,* No. ½, 82-90. [Biochem. Lab., Fac. Agric., Univ. Miyazaki.] In Japanese: English summary.—Yolk, white and germinal discs were examined by two-dimensional chromatography. From yolk 20 spots were detected, of which 14 were identified as of amino acids. The pattern was the same in white. In both yolk and white, leucine, glutamic acid, alanine and valine were in high concentration. In white, proline was the main acid and cystine and methionine sulphone were detected. In germinal discs of fertilised and unfertilised eggs the predominant acids were cystine, serine, glutamic acid, glycine, alanine, lysine, hydroxyproline, histidine, valine and arginine. See also Abst. 4243, Vol. 26. (From English summary.) (Nutrition Abstracts and Reviews)

KARAPETIAN, S. K. Novye fakty o gonadostimuliruiushchem vliianii sveta.
NEW FACTS REGARDING THE GONADOSTIMULATING EFFECT OF LIHGT. *Doklady Akad. Nauk SSSR 103 (3):* 525-528. 1955; Referat. Zhur., Biol., 1956, No. 46623. (Translation.)—Eleven azure-blue guinea hens were used in the experiments. These were subjected to artificially prolonged daylight (16 hours/day). The experiments were performed during the period of November-April with a light intensity of 7.5 W per 1 M^2. The hens commenced to lay eggs sooner and continued to lay them for a longer period of time, which resulted in an increase of 40% of eggs as compared with the control group. The period of egg laying in the experimental group extended over 7 months and in the control group over 4 months and 10 days. The experiments were repeated during the fall-winter months of the following year, which resulted in highly developed sex organs in the experimental guinea hens. Similar experiments failed to affect the sex instinct of the males and no tendency to copulation was seen up to the end of March, which is the ecologically normal period of copulation. (Biological Abstracts)

KING, A. S. and **D. F. KELLY.** (The Univ., Bristol, Eng.)
THE AERATED BONES OF GALLUS DOMESTICUS: THE FIFTH THORACIC VERTEBRA AND STERNAL RIBS. *Brit. Vet. Jour. 112(7): 279-283.* 1956.—Examinations were made by dissection as investigations had revealed that although tracheal injection is useful it is unnecessary. Aerated bones include: the whole of the vertebral column, except the first 2 cervical and the free coccygeal vertebrae and the pygostyle; the pelvic girdle; the sternum; the first 2 vertebral ribs; the 2nd and 3rd sternal ribs; the humerus and the coracoid. The 5th thoracic vertebra was aerated in 12 of 50 birds examined and the 2nd or 3rd sternal rib in 5 of 38. (Biological Abstracts)

LAKE, P. E. 1957. (Poult. Res. Centre, Edinburgh.)
FOWL SEMEN AS COLLECTED BY THE MASSAGE METHOD. *J. agric. Sci., 49:* 120-126.—The reflex ejaculation responses of cocks to lumbar massage were examined, and the basic reactions are described. A list of the crude fluid components obtained by the massage technique of semen collection is given. From these observations and an examination of the contents of the hen's vagina after natural and artificial insemination, it was deduced that the normal ejaculate of the cock is composed mainly of the contents of the vasa deferentia, with some secretions from the mucosal glands of the vascular bodies and lymph folds. The blood plasma exudate sometimes expelled into the semen is obtained as a result of compression of the terminal organs during the collection procedure.—From author's summary. (Animal Breeding Abstracts)

MORGAN, W., and **W. KOHLMEYER.** 1957. (Dep. Poult. Husb., South Dakota State Coll., Brookings.)
HENS WITH BILATERAL OVIDUCTS. *Nature* [*Lond.*], *180:* 98. —Persistence of the right oviduct in rudimentary form was observed in 6 out of 9 mature R.I.R. hens of an inbred strain (line SD-11) which were autopsied between 15th Aug. and 1st Nov. 1956. In 4 hens the rudiment was about half the length of the normal duct; in the 2 other hens it was shorter, and each had a cystic mass appended distally. The right ovary was absent in all cases. The relatively high incidence of persistence of the right oviduct in this strain suggests that in the domestic fowl the condition may be genetically determined. (Animal Breeding Abstracts).

RINGER, ROBERT K., P. D. STURKIE, and **H. S. WEISS.** (Rutgers U., New Brunswick, N. J.)
EFFECT OF MAMMALIAN GONADOTROPHINS (PMS and FSH) ON THE GROWTH RESPONSE OF THE OVIDUCT OF WHITE LEGHORN CHICKS. *Poultry Sci. 36(2):* 435-437. 1957.—Female chicks, approximately 5 weeks old, were treated with 100 IU of pregnant mare serum (Gonadogen) subcutaneously every other day, or 30 Armour units of follicle stimulating hormone daily, for 10 days. At the end of treatment, the ovaries and comb of both groups weighed 2-4 times, and the oviduct 20-30 times that of the controls. Histological examination of the ovaries revealed no significant follicular development. Apparently then, cells and tissue other than those connected directly with follicular maturation are capable of secreting considerable quantities of estrogen under gonadotropic stimulation.—From auth. summ. (Biological Abstracts)

SHOFFNER, R. N., and **T. H. CANFIELD.** (U. Minnesota, Minneapolis.)
KEEL DEFECTS IN MALES RANGED WITH AND WITHOUT ROOSTS. *Poultry Sci. 36(2):* 445-446. 1957. (Biological Abstracts)

SMIRNOVA, E. I. 1957. (All-Un Inst. Anim. Breed.) Vlijanie uljtrafioletovyh lučei na produktivnostj i fiziologičeskoe sostojanie kur.
THE EFFECT OF ULTRA-VIOLET LIGHT ON THE PRODUCTIVITY AND PHYSIOLOGY OF HENS. *Pticovodstvo, 7(7):* 40-43. —At the State Farm Podoljskii in the Moscow Province from 1st Dec. 1955 to 15th April 1956, 500 hens were subjected for 9 hrs. 3 times

per week to rays from luminescent lamps, and a further 700 hens for 30 mins. daily to rays from quartz-mercury-vapour lamps: 400 hens served as controls. In the experimental period production averaged 47.34 and 39.12 eggs in the 2 experimental groups resp., which was 54.2 and 27.4% resp. greater than that of the controls. In the year 1st Nov. 1955-1st Nov. 1956 production averaged 150.3 and 147.4 eggs resp. in the 2 experimental groups and 127.6 eggs in the control group. Egg weight was 4.8 and 6.6% resp. greater for the 2 experimental groups than for the controls. The moult was earlier in the experimental groups and lasted 3-4 wks. *v.* 2 mths. in the controls. The blood picture and metabolism were also studied. (Animal Breeding Abstracts)

SMITH, A. H. (U. California, Davis), **G. N. HOOVER, J. O. NORDSTROM,** and **C. M. WINGET.**
QUANTITATIVE CHANGES IN THE HEN'S OVIDUCT ASSOCIATED WITH EGG FORMATION. *Poultry Sci. 36(2):* 353-357. 1957.—The hen's reproductive organs and their component parts exhibit cyclic weight changes during egg formation. In most instances, these changes are associated with a functional activity. Weight loss in the magnum, associated with albumen deposition, is approximately equivalent to the weight of dry matter in the albumen secreted. It is concluded that the albumen proteins are accumulated intracellularly, with very little added water, in the inter-secretory period, and that these albumen precursors are hydrated, and ionic material added, at the time of deposition. Such an arrangement would account for the conflict between microscopic observations (which indicate an acculation of albumen throughout the inter-secretory period) and chemical analysis (which indicates, at least in the case of phosphate, accumulation at the time of deposition.)—*A. H. Smith.* (Biological Abstracts)

SMITH, A. H., G. H. BOND, K. W. RAMSEY, D. G. RECK, and **J. E. SPOON.** (U. California, Davis.)
SIZE AND RATE OF INVOLUTION OF THE HEN'S REPRODUCTIVE ORGANS. *Poultry Sci. 36(2):* 346-353. 1957.—Following a moult-inducing stimulus, the reproductive organs of the hen decrease in size. The oviduct loses about 13% of its weight per day for the first 9 days of involution and about 4% of its weight per day thereafter. The involution of the oviduct appears to be more rapid than the processes of mammary involution or atrophic degeneration of limbs, which have been reported by others.—*A. H. Smith.* (Biological Abstracts)

STUTTS, ENSEL C., W. E. BRILES, and **H. O. KUNKEL.** (Texas Agric. Expt. Sta., College Station.)
PLASMA ALKALINE PHOSPHATASE ACTIVITY IN MATURE INBRED CHICKENS. *Poultry Sci. 36(2):* 269-276. 1957.—The plasma alkaline phosphatase activity was determined for mature male and female birds of 3 White Leghorn inbred lines. Evidence of biochemical individuality was obtained in that repeatability estimates between subsequent plasma alkaline phosphatase activities determined 8 days apart in females and from 9 to 107 days apart in males were statistically significant within both sexes of the 3 inbred lines under study. Males of 2 lines had lower phosphatase activity than those of the other line. Females of one line had lower phosphatase activity than did the females of the other 2 lines. These line differences provide evidence to indicate the phosphatase level is in part genetically controlled. A maternal half-sib correlation using phosphatase data from 1952, 1953, and 1954 males of these three lines resulted in a heritability estimate of 0.35, and a paternal half-sib correlation gave an estimate of 0.40. A heritability estimate from the maternal half-sib correlation, using data from the females, was only 0.03. These preliminary intraline heritability estimates are based on nonsignificant sire and dam dfferences, but a lower repeatability in the female may have caused the very low estimate of heritability. In each line the phosphatase activity of females was higher and more variable than that of the males. Age had no signifi-

cant influence on phosphatase activity. Fasting a group of mature non-inbred line of White Leghorn males for a 24-hour period resulted in a small but highly significant decrease in their phosphatase activity.—*H. O. Kunkel.* (Biological Abstracts)

VAN TIENHOVEN, A. (Cornell U. Agric. Expt. Sta., Ithaca, New York.) A METHOD OF "CONTROLLING SEX" BY DIPPING OF EGGS IN HORMONE SOLUTIONS. *Poultry Sci. 36(3):* 628-632. 1957.—Dipping of eggs into estrogen emulsions is an effective means of introducing the hormone into the egg. With increasing age the estrogen-induced ovarian cortex in genetic males decreases in size. The testes at 6 months of age are smaller and show delayed spermatogenesis in the experimental birds when compared to controls. In genetic females, hatched from estrogen-treated eggs, egg production is depressed severely because of a high incidence of ovulations into the body cavity. The fact that the ova are not picked up by the oviduct can be explained by the insufficient size of the latter. Injections of estrogen into the genetic males hatched from estrogen-treated eggs did not prevent the transformation of the experimentally modified gonad into a testis.—From the auth. abst. (Biological Abstracts)

WARNOCK, NELTA HYDER, THOMAS B. CLARKSON (S. E. Massengill Co., Bristol, Tenn.), and **RICHARD STEVENSON.** EFFECT OF EXERCISE ON BLOOD COAGULATION TIME AND ATHEROSCLEROSIS OF CHOLESTEROL-FED COCKERELS. *Circulation Res. 5(5):* 478-480. 1957.—Three-week-old cockerels were fed ad libitum an atherogenic diet of Purina Mash, 1% cholesterol and 4% peanut oil. Brisk walking, 5 days of approximately 4.2 miles/week, for 14 weeks lowered serum cholesterol levels significantly after 5 weeks. Fourteen-week serum cholesterol values in non-exercised and exercised birds were 1577 and 779 mg/100 ml, respectively. At 14 weeks weight and blood coagulation time were significantly increased (1655 and 1858 g, p 0.01; 150 and 242 second, p 0.001) by exercise. Arterial, hepatic and brain tissue cholesterol levels were significantly lower in the exercised birds.—Authors. (Biological Abstracts)

NUTRITION

ANDERSON, H. J., J. J. VACANTI, and **M. C. LIND.** (Cudahy Labs., Omaha, Nebraska.) AN ENTERIC GROWTH FACTOR FOR CHICKS. *Poultry Sci. 36(3):* 675-676. 1957.—An enteric growth factor (EGF), derived from swine, is suggested as a new unidentified growth factor, useful in animal feeds. Experiments on feeding EGF to chicks indicate the factor is a new one since, when added to complete commercial chick starter feed containing usual valuable nutrients, such as unidentified growth factors, vitamins, antibiotics, etc., considerable additional responses in weight increase over controls are obtained. Further studies are in progress, studying effects of adding EGF to various other chick formulas as well as to swine rations.—Auth. summ. (Biological Abstracts)

ANDERSON, J. O. (Utah State Agric. Coll. U. Logan.) EFFECT OF ALFALFA SAPONIN ON THE PERFORMANCE OF CHICKS AND LAYING HENS. *Poultry Sci. 36(4):* 873-876. 1957. —Saponin isolated from alfalfa was fed to New Hampshire chicks at levels from 0.05 to 0.5% of the diet. The 0.05% level did not affect growth or feed efficiency; the 0.1% level significantly decreased growth and feed efficiency. As the saponin level was increased from 0.1 to 0.5%, the growth depression increased. Addition of 1% cholesterol completely overcame the depression produced by 0.3% saponin. The saponin was fed to hens at a level of 0.3% for 47 days. Egg production decreased immediately following the addition, but within 10 days had returned

to the level noted before the saponin addition. Production during the last 5 weeks of the saponin feeding period was higher than that in 3 similar pens of hens fed the same diet without added saponin. Addition of the saponin to the hens' ration did not affect the growth rate of their chicks. —*J. O. Anderson.* (Biological Abstracts)

ASCARELLI, I. (Hebrew U., Rehovot. Israel.)
THE USE OF VITAMIN A PROTECTED BY DPPD (DIPHENYL-P-PHENYLENE-DIAMINE) FOR THE GROWTH OF CHICKENS. *Poultry Sci. 36(3):* 549-551. 1957.—Growth experiments were carried out with 4 groups of day-old chicks until the age of 10 weeks. Fish oil and dry coated vitamin A concentrate (at a level of 400 I.U./100 grains feed) were used as vitamin A sources, both in presence and absence of the anti-oxident DPPD. Increases of weight of the chicks and increases of vitamin A content of the livers was greater when vitamin A supplied as a stabilized concentrate than when vitmain A supplied as fish oil. DPPD did not appear to influence the utilization of either form of vitamin A.—*I. Ascarelli.* (Biological Abstracts)

ASCARELLI, I. and **A. BONDI.**
THE EFFECT OF DIFFERENT PLANT SOURCES ON THE UTILIZATION OF CAROTENE BY CHICKENS. *J. Agric. Sci.*, 1957, *49*, 113-119. [Fac. Agric., Hebrew Univ., Rehovot, Israel.]—Chicks deprived of vitamin A for 7 days after hatching were given a basal ration lacking vitamin A and carotene, supplemented, per 100 g., with 500 I.U. vitamin A in fish liver oil, or its equivalent in carotene, 300 μg., from horse beans, berseem clover, green oats, sweet potato leaves, cowpeas or maize leaves. Utilisation of carotene was judged by liveweight gains and liver reserves of vitamin A. All the forages except clover supported normal growth to 8 weeks of age. Chicks receiving preformed vitamin A stored in their livers from 5 to 12 per cent of the intake. Liver reserves varied widely with forages, the percentage of the vitamin A equivalent recovered ranging from 0.25 when horse beans were given to 27 with green oats. No plant constituent which depressed or increased utilisation of carotene was found. The apparent digestibility of carotene in the different forages varied from 38 to 59 per cent, and was not related to vitamin A storage, except in sweet potato leaves, where low digestibility was associated with low liver reserves. The stereoisomeric composition of the β-carotene and the xanthophyll: carotene ratio were similar in all plants.

It is concluded that satisfactory growth can be obtained in young chicks given green plants as the sole source of vitamin A, but liberal amounts should be given because of the variability of carotene content. (Nutrition Abstracts and Reviews)

ATKINSON, R. L. (Texas Agric. and Mechanical Coll., Coll. Sta.), **A. A. KURNICK, T. M. FERGUSON, B L. REID, J. H. QUISENBERRY,** and **J. R. COUCH.**
PROTEIN AND ENERGY LEVELS FOR TURKEY STARTING DIETS. *Poultry Sci. 36(4):* 767-773. 1957.—Broad Breasted Bronze poults were used to study the protein requirements and optimum Calorie-protein ratio during the first 8 weeks of the growing period. A product containing 70% methyl esters of the fatty acids derived from cottonseed oil was fed and the poults could efficiently utilize such a product as a source of energy. A protein level of 28% with a Calorie-protein ratio of 30/1 (840 Calorie-protein energy) was required for optiumum growth and feed efficiency for turkey poults up to 8 weeks. At higher dietary protein levels the Calorie-protein ratio was less critical. Less protein was required/unit of gain when the productive energy, within each protein series, was increased.—Auth. summ. (Biological Abstracts)

BAINTNER, K., F. BISKUP, and **K. JELENITS.** Különböző élesztökkel végzett baromfinevelési kísérletek.
POULTRY REARING WITH DIFFERENT YEASTS. *Rep. Fac. Animal Husb., Hung. Univ. Agric. Sci.*, 1956, No. 5, 221-236. Russian,

German and English summaries.—The yeasts studied were baker's yeast containing 6 and 7 per cent N dried at low temperature, 50° to 60° C., and baker's and brewer's yeasts each containing 8 per cent N dried at high temperature, 110° C. Chickens aged 1 week were given for 34 to 39 days a diet of purely vegetable origin with, per 100 kg. protein, 5 kg. yeast or 10 to 15 kg. of residue from extraction of fat. Weight gain and feed utilisation were best on brewer's yeast. Baker's yeast dried at high temperature was almost as good; dried at low temperature it also gave good results, the difference in degree of effectiveness depending on the number of living and dead yeast cells [not stated in summaries which cells were beneficial]. Baker's and brewer's yeasts contained the same amino acids but in differing amounts. (Nutrition Abstracts and Reviews)

BAKER, R. C., F. W. HILL, A. Van TIENHOVEN, and J. H. BRUCKNER. (Cornell U., Ithaca, New York.)
THE EFFECT OF NICARBAZIN ON EGG PRODUCTION AND EGG QUALITY. *Poultry Sci.* 36(4): 718-726. Illus. 1957.—The coccidiostatic drug nicarbazin (4,4' - dinitrocarbanilide - 2- hydroxy - 4,6 - dimethylpyrimidine) when fed to laying hens caused blemished yolks. Levels of nicarbazin as high as 0.0125% caused severe blemishes on most yolks, while a level as low as 0.0015% caused minor blemishes on a few yolks. Egg production was markedly reduced only by feeding relatively high levels of nicarbazin (0.0125%). Egg size was reduced by feeding 0.006% or more of the coccidiostat. Levels as high as 0.009% caused heavy breed hens to lay white shelled eggs. A level of 0.003% had no effect on shell color but it did cause yolk blemishing. Storage for 1 or 2 weeks increased the incidence of blemished yolks with treated eggs. The dinitrocarbanilide part of the drug was found on the yolk.—Auth. summ. (Biological Abstracts)

BALDISSERA, NORDIO C. Effeti dell'acqua di bevanda clorurata sugli incrementi ponderali dei giovani polli.
THE EFFECT OF SALINE DRINKING WATER ON WEIGHT GAINS IN YOUNG CHICKS. *Riv. Zootec., 1957, 30,* 190-192.—Cockerels 45 to 72 days old grew better during 10 or 20 days when given a 0.25 percent solution of NaCl to drink than when given water. A stronger solution, 0.50 per cent, was not as effective as the weaker. Unsexed chicks given 0.25 per cent NaCl also grew better to 82 days than controls getting water to drink, but a 0.15 per cent solution depressed growth. Feed intake was less and water consumption greater in the experimental groups. The breast muscle of the treated birds had somewhat less protein and more moisture and much more ash than that of controls. The appearance and organoleptic qualities of the carcases were of high standard. The response to treatment was greater in cockerels than in pullets. (Nutrition Abstracts and Reviews)

BALLOUN, S. L., and R. E. PHILLIPS. (Iowa State Coll., Ames.)
LYSINE AND PROTEIN REQUIREMENTS OF BRONZE TURKEYS. *Poultry Sci. 36(4):* 884-891. 1957.—The protein requirement of Broad Breasted Bronze poults was at least 27% to 6 weeks of age. When diets were supplemented with L-lysine, 25% protein was sufficient for maximum growth and feed conversion. In the 6-12 weeks' period maximum growth was obtained on 23 and 21% protein diets for males and females, respectively. Lysine supplementation reduced the requirement by 2%. The protein requirement was 20% for males and 18 for females at 12 weeks, decreasing rapidly thereafter to about 12% at 24 weeks. At all ages, the protein level required for best feed efficiency and least-cost was lower than that for maximum weight gains.—*S. L. Balloun.* (Biological Abstracts)

BARTH, K. Die Verwendung von Fett in Geflügelmastrationen.
THE USE OF FAT IN FATTENING RATIONS FOR POULTRY. *Arch. Geflügelk., 1957, 21,* 86-95. [Inst. Physiol. Tiere, Univ. Munich.] English Summary.—Young chicks were given fattening rations having different percentage protein: energy, in Cal. per kg., ratios and contain-

ing from 3 to 15 per cent of lard or beef fat. Up to 5 weeks of age the most satisfactory protein: energy ratio was between 1:94 and 1:97 and from the 6th to the 9th week between 1:100 and 1:103. It is recommended that the fattening ration should contain from 21 to 25 per cent protein and 2000 or more Cal. productive energy per kg. [On pp. 90, 91, in Table 4 and summary the ratio is stated as energy : protein without altering the order of the figures.] (Nutrition Abstracts and Reviews)

BEATY, ANNABEL, FRANCIS J. CONLAN, SANDRA McMINN, and **S. M. WEISBERG.** (Natl. Dairy Products Corp., Oakdale, Long Island, N. Y.)

ASSESSING PROTEIN QUALITY WITH THE INDIVIDUAL PROTEIN-DEPLETED CHICK. *Jour. Agric. and Food Chem. 5(7):* 541-544. 1957.—Techniques and equipment are described for carrying out protein assays on individual protein-depleted chicks. Assays with a mixture of casein, gelatin, and DL-methionine at dietary levels of 6.5, 9, and 12% of protein were employed as a standard of reference. Dairy products were assayed as the sole source of protein in combination with other proteins commonly used in experimental chick rations. Data are presented to show the differences in response of protein-depleted chicks and rats to 3 sources of protein.—Authors. (Biological Abstracts)

BENTON, D. A., H. E. SPIVEY, and **C. A. ELVEHJEM.** (U. Wisconsin, Madison.)

PROPERTIES OF SUBSTANCES IN GELATIN WHICH STIMULATE THE GROWTH OF CHICKS FED AMINO ACID DIETS. *Arch. Biochem. and Biophys. 70(2):* 491-498. 1957.—Chicks grew more rapidly when 5% of gelatin was added to an amino acid diet. Tests of fractionations made of an acid hydrolysate of gelatin showed that the growth-stimulating activity was not extracted with n-butanol, but was partly extracted with phenol; was not precipitated by basic lead acetate or phosphotungstic acid; was not held on a column of Amberlite 1R4B in the hydroxide form, but was held by a column of Dowex 50 in the hydrogen form and eluted with 1.5 *N* HCl. The properties of the active materials are discussed.—*H. E. Spivey.* (Biological Abstracts)

BIERI, J. G. (Natl. Insts. Health, Bethesda, Maryland.)

A SIMPLIFIED METHOD FOR ADMINISTERING VITAMIN A TO CHICKS FED PURIFIED DIETS. *Poultry Sci. 36(4):* 918-919. 1957.—A solution of 7.5 mg vitamin A acetate in 5 ml ethanol, 0.5 ml Tween 50 and 4.5 ml water was added to the drinking water (800-1000 ml) of chicks at weekly intervals. The diets were purified types, with or without vitamin E or fat. Analysis of the livers after 4 weeks revealed adequate stores of vitamin A when compared with chicks receiving the vitamin in the diet. Growth was normal in chicks drinking vitamin A.—*J. G. Bieri.* (Biological Abstracts)

BIERI, J. G., C. J. POLLARD, and **G. M. BRIGGS.**

ESSENTIAL FATTY ACIDS IN THE CHICK. 2. POLYUNSATURATED FATTY ACID COMPOSITION OF BLOOD, HEART AND LIVER. *Arch. Biochem. Biophys.*, 1957, *68*, 300-307. [Lab. Nutrit. Endocrinol., Nat. Inst Arthritis Metabol. Dis., Bethesda, Md.]—Chickens were fed from one day of age on a fat-free diet (Abst. 3719, Vol. 27) for as long as 6 months. Birds were killed at intervals and the polyethenoid fatty acid content of plasma, heart muscle and liver was estimated.

Similar changes occurred in all the tissues studied. Diethenoid and tetraethenoid fatty acids decreased and triethenoid acids increased; some minor changes in the penta- and hexaethenoid fatty acid content were found. Addition of a small amount of methyl linoleate to the diet reduced the changes. (Nutrition Abstracts and Reviews)

BLACK, D. J. G., T. R. MORRIS (U. Reading, Eng.), and **J. A. PALGRAVE.**

THE VALUE OF A GRASS SWARD FOR BREEDING HENS. *Poultry Sci. 36(4):* 780-788. 1957.—Two-year-old hens were kept out of doors with and without access to a grass sward. Six diets of varying vita-

min and protein content were fed for a test period of 64 weeks. Access to grass had no measurable effect upon the birds' egg production, food consumption, hatchability or fertility on any of the 6 diets. There was an increase in the vitamin A, riboflavin and pigment content of eggs laid by hens having access to grass. Hens fed diets containing 5.5% and 11% of white fish meal showed depressed hatchability of fertile eggs, the extent of the depression being proportional to the level of fish meal fed.—*T. R. Morris.* (Biological Abstracts)

BOLTON, W. (Poultry Res. Centre, Edinburgh.)
THE INCIDENCE OF HEAD RETRACTION IN NEWLY-HATCHED CHICKS AND THE MANGANESE CONTENTS OF THE EGGS OF SOME INBRED LINES OF BROWN LEGHORN FOWLS. *Poultry Sci. 36(4):* 732-735. 1957—The incidence of head retraction in newly hatched chicks and the Mn content of the eggs of 8 inbred lines of Brown Leghorn fowls were determined for 2 diets, which contained 66 ppm and 95 ppm Mn, respectively. On both diets the lines differed in their abilities to transfer Mn from food to egg. The higher dietary level was accompanied by a reduction in the average incidence of head retraction, an increase Mn content of the eggs from 5 lines, a slight decrease in those from 2 lines, and no change in the 8th. It is suggested that the head retraction is partly genetic in origin.—*W. Bolton.* (Biological Abstracts)

BONSEMBIANTE, M. Ricerche comparative sull' accrescimento dei pulcini trattati con prodotti antibiotati ed un detergente.
COMPARATIVE STUDIES ON THE GROWTH OF CHICKS TREATED WITH ANTIBIOTICS AND A DETERGENT. *Ann. Sper. agrar., 1957, 11,* 629-651. [Ist. Zootec. Gen., Univ. Padua.] English summary.—In chickens fed on practical rations containing animal protein, and reared under practical conditions, supplements of commercial products supplying penicillin, terramycin or aureomycin increased growth rate and efficiency of feed conversion. Up to 4 weeks the effects of penicillin and terramycin were significant, but over the whole period from day-old to 10 weeks only that of penicillin. All the antibiotics were most effective in the younger birds, and the difference between treated and control birds diminished during the second half of the period. A commercial alkyl sulphonate, a surface-active agent, reduced growth rate and efficiency, but not significantly. Revelant literature is reviewed. The importance of type of ration and level of feeding and of antibiotic supplement for growth stimulation, the mode of action of antibiotics and the use of antibiotics for animals for slaughter or for breeding are discussed. (Nutrition Abstracts and Reviews)

BONSEMBIANTE, M. and **A. CAMERRA.** Indagini sperimentali sull'impiego del contenuto di rumine nell'alimentazione dei polli.
EXPERIMENTAL RESULTS ON THE USE OF RUMEN CONTENTS FOR FEEDING CHICKS. *Riv. Zootec., 1957, 30,* 225-231.—The preparation of dried extracts of rumen contents and of rumen liquor from slaughtered cattle is described. The extracts were used in growth trials with chickens from day-old to 8 weeks. The rumen content extract as 5 per cent of the ration gave as good growth as the 5 per cent dried lucerne meal which it replaced. When 5 per cent lucerne meal was replaced by 2 per cent of rumen liquor extract, growth was significantly less than on either of other rations, and signs of riboflavin deficiency appeared in some birds. Efficiency of feed utilisation was better in both experimental groups than on the control ration, but in the group getting rumen liquor extract it was irregular. It is suggested that too little rumen liquor extract was given. On the basis of present results only the use of rumen content extracts is recommended. (Nutrition Abstracts and Reviews)

BROWN, W. O.
THE TRANSFER OF MATERNAL DIETARY RIBOFLAVIN TO THE EMBRYO DURING DEVELOPMENT IN THE COMMON FOWL. *J. Agric. Sci.,* 1957, *49,* 88-94. [Minist. Agric., N. Ireland.]—

Three groups of hens were given a basal diet low in riboflavin (group 1) or this diet supplemented per g with 2μg. (group 2) or 4 μg. riboflavin (group 3). Experiments on chicks from these hens confirmed that the riboflavin content of the egg had a direct effect on subsequent growth. The riboflavin content of the livers was estimated at hatching and after 4 and 10 days on a low-riboflavin diet. The livers from the partly deprived chicks contained, initially, 12.8 μg. per g., compared with 28 to 33 μg. in chicks from hens receiving riboflavin supplements. Differences subsequently became less as the riboflavin content decreased and at 10 days of age were not statistically significant.

After 8 days' incubation, the mean total content of the embryo in eggs from group 1 was only half that of embryos from groups 2 and 3. At 15 days there was a considerable increase in the riboflavin content per g. tissue in embryos from the supplemented groups but not from group 1, which may explain the peak of embryo mortality at 14 days which is associated with riboflavin deficiency. There were significant differences in riboflavin content between the embryos from group 1 and the supplemented groups at all stages of development, but not between the supplemented groups. At hatching all the riboflavin initially present in the eggs from group 1 was recovered from the embryo; in the eggs from the other groups recoveries were incomplete. Vitamin injected into the egg was as fully utilised as dietary riboflavin deposited during egg formation. When hens on the basal diet were each given 1 mg. riboflavin on alternate days, about 3 weeks were required to raise the riboflavin content of an egg from an initial value of 90 μg. to an average of about 200 μg. Qualitative chromatographic separation of the flavins of fertile eggs demonstrated that during development free riboflavin decreased from 80 to 30 per cent and flavin mononucleotide and flavin adenine dinucleotide increased correspondingly. (Nutrition Abstracts and Reviews)

BUNNELL, R. H. (U. Connecticut, Storrs.)
THE VITAMIN E POTENCY OF ALFALFA AS MEASURED BY THE TOCOPHEROL CONTENT OF THE LIVER OF THE CHICK *Poultry Sci. 36(2):* 413-416. 1957.—Using liver storage as the criterion of measurement, a two-point assay was carried out to determine if vitamin E from alfalfa, as chemically determined, was utilized as effectively as α-tocopherylacetate. The actual vitamin potency of alfalfa leaf meal was about 1/3d of that determined by chemical assay. This could be due to destruction of the vitamin E (alcohol form) in the intestinal tract. The use of liver tocopherol stores as a method of bioassay for vitamin E potency of feedstuffs for chicks shows promise, particularly for those feeds which present difficulty in chemical determinations. (Biological Abstracts)

BURNS, E. O.
WHAT DO YOUR FOWLS EAT? *Queensland Agric. Jour. 82(3):* 161-167. Illus. 1956.—A survey was taken among 128 farmers who hold 109,618 birds in South Queensland. The survey showed that 77% feed mash and grain, 6% mash, grain and pellets, 2% mash only. Of the remaining 15% of the farmers 6% feed grain only, 4% grain and pellets, and 5% pellets only. The mash was 75% of commercial mixes. As to the farmers feeding grain, 48% used wheat only, 12% wheat and maize, 12% wheat, maize and sorghum, 12% wheat and sorghum, 10% sorghum, 4% maize and sorghum and 2% maize only. As to poultry breeds, 34% of the flocks were Australorps, 16% cross-breeds, 10% Leghorns and 40% mixed flocks.—*T. L. Bissell.* (Biological Abstracts)

CAMP, A. A. (Texas Agric. Expt. Sta., Gonzales), **B. G. CREECH,** and **J. R. COUCH.**
CORN GLUTELIN PROTEIN AS A SOURCE OF AMINO ACIDS FOR THE GROWING CHICK. *Poultry Sci. 36(4):* 828-831. 1957.—Corn glutelin protein was investigated as a source of amino acids in practical poultry diets. Three experiments were carried out under practical conditions, using 200 chicks/group, supplementing the diet

with 2.5, 5, and 10% levels of corn glutelin protein; in the presence of methionine, methionine and fish meal, penicillin, and penicillin and methionine. Results of these studies indicated that corn glutelin protein, a by-product from the isolation of zein, was approximately equal to soybean oil meal as a source of amino acids for the chick up to the 10% supplementation level. This protein supplement was apparently better utilized in the presence of penicillin or a combination of penicillin and methionine. Amino acid content and availability in corn glutelin protein was also determined. The percentage availability of the amino acids ranged from 92.6% up to 111.1% which compares quite favorably with the values reported for soybean oil meal. The amino acid composition determined microbiologically is also reported.—Auth. summ. (Biological Abstracts)

CARPENTER, K. J.
INTENSIVE RATIONS FOR LAYING HENS. *Agriculture, J. Minist. Agric. Engl.*, 1957, *64*, 265-270. [Sch. Agric., Univ. Cambridge.]—The importance of increasing the precentage of protein in a laying mash when the energy content is increased is stressed. Rations with a low energy content of 1.09 metabolisable Therm per lb. should have about 12 per cent protein if given alone, or 14 per cent if given with grain. The corresponding percentages for high-energy rations with 1.36 metabolisable Therm per lb. are 15 and 18 per cent. Cal. per kg. are converted to Therms per lb. by dividing by 22. The value of protein is discussed and suggested correction factors for proteins of low and high quality are given. (Nutrition Abstracts and Reviews)

CARPENTER, K. J., G. M. ELLINGER, M. I. MUNRO and **E. J. ROLFE.**
FISH PRODUCTS AS PROTEIN SUPPLEMENTS TO CEREALS. *Brit. J. Nutrition*, 1957, *11*, 162-173. [Rowett Res. Inst., Bucksburn, Aberdeenshire.]—Several dehydrated fish products were tested as supplementary protein to cereals using the standard "gross protein value" technique with chickens (Abst. 1281, Vol. 26). The products investigated included vacuum-dried cod fillet before and after heating to 55° or 100° C. in the dry state and heating to 105° C. in humid atmosphere, spray-dried fish albumin, acetone-dried fish offal and white fishmeal.

The commercial fishmeals gave results about 10 per cent lower than those obtained with preparations which had been dried at a low temperature. The "gross protein value" of vacuum-dried cod fillets of 2 to 3 per cent moisture content was not significantly reduced by heating the material at 100° C. for 31 hr. in spite of much browning and NH_3 formation. A reduction of nutritive value of about 28 per cent was found when similar fillets in which the moisture content had been increased to 11 per cent were heated at 105° C. for 36 hr. before feeding. The value of heat-damaged fillets and commercial fishmeals was increased by addition of lysine. The biological results were well correlated with "available lysine" as estimated chemically by reaction of the test proteins with fluorodinitrobenzene followed by hydrolysis and estimation of ε-dinitrophenyl-lysine. (Nutrition Abstracts and Reviews)

CARTER, R. D., J. W. WYNE (Ohio Agric. Expt. Sta., Wooster), and **H. YACOWITZ.**
EFFECT OF DIETARY ENERGY AND PROTEIN LEVEL ON GROWTH AND FEED CONVERSION OF TURKEYS FROM 8 TO 16 WEEKS OF AGE. *Poultry Sci. 36(4):* 824-828. 1957.—Rations containing 0, 3 and 6% added animal fat were fed in combination with protein levels of 17, 20 and 23% to Small-type White turkeys. Rations containing 17% protein and up to 6% added fat and 1004 Calories of productive energy/pound supported adequate growth and feed conversion in this type turkey from 8 to 16 weeks of age. Feed conversion was progressively improved as the level of energy was increased by the addition of animal fat. In a 2nd experiment, rations containing 0, 3 and 6% added animal fat were fed in combination with protein levels of 14, 17 and 20% to Large-type White turkeys from 8 to 16 weeks of age. The 14 and 17% protein rations did not support normal growth in this type turkey. Feed conversion was improved by raising the protein level above 14%. Addi-

tion of animal fat to rations containing 14% protein improved feed efficiency but had little influence in rations containing 17 or 20% protein. This lack of response to the addition of fat in the 17 and 20% protein rations may be partially explained in that the experiment was conducted during the hot summer months. It was concluded that rations containing 20% protein and up to 6% added animal fat and 957 Calories of productive energy/pound will support adequate growth and feed conversion in Large-type White turkeys from 8 to 16 weeks of age. The results of these experiments indicate that body size may influence protein requirement and that different rations might be formulated for the various types of turkeys. There were also indications of a protein sparing effect when the energy level of turkey growing rations was increased by the addition of animal fat.—*R. D. Carter* (Biological Abstracts)

CHANG, M. L. W. and **B. C. JOHNSON.**

NICOTINIC ACID METABOLISM. 3. C^{14}-CARBOXYL-LABELED NICOTINAMIDE AND NICOTINIC ACID IN THE CHICK. *J. Biol. Chem.*, 1957, *226*, 799-804. [*Lab. Animal Biochem., Div. Animal Nutrit.*, Univ. Illinois, Urbana.]—For parts 1 and 2 see Abst. 424, Vol. 24.

3. C^{14}-Carboxyl-labelled nicotinamide and unlabelled nicotinic acid were given intraperitoneally in approximately physiological amounts and their excretion products were separated by chromatography. Normal chicks, 14 weeks old, were operated on to permit separation of urine and faeces, and urine was collected every 4 or 5 hr. over 24 hr. All samples from each chick were pooled. In urine of birds given labelled nicotinamide or unlabelled nicotinic acid, 7 nicotinyl derivatives were found by radio-autography or the CNBr colour test, respectively. The methods of isolation, purification and identification of the metabolites are described. In addition to dicinotinyl ornithine, nicotinic acid, and traces of nicotinamide, two new compounds, δ-nocotinyl ornithine and α-nicotinyl ornithine, were found, and β-nicotinyl-D-glucuronic acid and nicotinuric acid, not previously described in chick urine, were identified. No methylated or quaternary nicotinyl compound was found. (Nutrition Abstracts and Reviews)

COWLISHAW, S. J., and **D. E. EYLES.**

THE VALUE OF LEAF-PROTEIN CONCENTRATES FOR GROWING AND LAYING PULLETS. *Empire Jour. Exptl. Agric. 24(95):* 223-234. 1956.—Leaf-protein concentrates were compared with fish meal and ground-nut meal and the best were found to be equal to fish meal for growth of pullets but none was as good as fish meal for egg production. A comparable egg production resulted from 3% fish meal crude protein, 5% ground-nut crude protein and 5% leaf-protein (lucerne) concentrate crude protein. Quality was not affected but leaf-protein darkened the yolk color.—*C. E. Foister.* (Biological Abstracts)

CREECH, B. G., G. L. FELDMAN, T. M. FERGUSON, B. L. REID and **J. R. COUCH**

EXUDATIVE DIATHESIS AND VITAMIN E DEFICIENCY IN TURKEY POULTS. *J. Nutrition*, 1957, *62*, 83-95. [Dept. Biochem., Texas Agric. and Mech. Coll. System, College Station.]—White turkey poults were obtained from dams which had received a basal diet alone or with 20 mg. vitamin E per lb. diet, or 5 per cent brewer's yeast, or vitamin E and brewer's yeast. The poults were divided into 2 equal groups of 15 birds each and were given a diet containing 76 per cent torula yeast with or without a supplement of 20 mg. α-tocopheryl acetate per lb. diet. At 4 weeks of age exudative diathesis was present in 11 of the poults on the deficient diet, of which 8 were from dams on the basal diet alone and 3 from dams on the basal diet with added vitamin E. The average weight of the deficient group at 4 weeks was 178 g., compared with 214 g. for the supplemented group. There was a slight, and not significant, beneficial effect of vitamin E in the dam's diet on the erythrocyte count, but a highly significant carryover from brewer's yeast. Vitamin E in the poult diet gave significant increases. Hb responses followed the same pattern as the erythrocyte counts. The anaemia

present was macrocytic. The albumin: globulin ratio was not affected by diet. In other trials day-old poults from dams given a deficient diet had greatly reduced albumin: globulin ratios. Tocopherol, 20 mg. per lb. diet, or 10 per cent dried brewer's yeast significantly increased the ratio. (Nutrition Abstracts and Reviews)

DAY, ELBERT J., and JAMES E. HILL. (Mississippi Agric. Expt. Sta., State College.)
THE EFFECT OF CALORIE-PROTEIN RATIO OF THE RATION ON GROWTH AND FEED EFFICIENCY OF TURKEYS. *Poultry Sci. 36(4):* 773-779. 1957.—The efficacy of 6 isocaloric rations containing varying C:P ratios were compared during the starting period (0-8 weeks) and during the growing periods (8-12 and 12-16 weeks). During the starting period a C:P ratio of 28:1 or less was better than wider ratios. Ratios of approximately 44.3:1 and 59:1 were equal in performance to more narrow ratios during the 8-12 and 12-16 weeks growing periods, respectively.—Auth. summ. (Biological Abstracts)

DEVINSKY, F. Pouzitie Dubosolu ako prisady do krmnej dávky kurčiat.
USE OF DUBOSOL AS AN ADDITION TO THE RATION OF CHICKENS. *Polnohospodarstvo,* 1956, *3* 604-619. [Res. Inst. Poultry Breeding SAV, Ivanka pri Dunaji, Czechoslovakia.] German and Russian summaries.—Dubosol, a waste product of oil refineries, containing the Na salt of aryl sulphonate, was added to the ration of chickens. The experiment lasted 14 weeks and each group was of 200 chickens. Experimental groups got 1 or 2 g. per kg. feed, controls none. There was no significant difference between controls and birds getting 2 g. Dubosol, but those getting 1 g. Dubosol were 21 per cent heavier and 40 per cent more efficient than those getting 2 g. Mortality was 14.54 per cent on 1 g. Dubosol, compared with 31.00 per cent in controls, and feed intake was 11 per cent less. The supplement at both levels gave carcases of good quality. (Nutrition Abstracts and Reviews)

DONALDSON, W. E., G. F. COMBS, G. L. ROMOSER, and W. C. SUPPLEE. (U. Maryland, College Park.)
STUDIES ON ENERGY LEVELS IN POULTRY RATIONS 2. TOLERANCE OF GROWING CHICKS TO DIETARY FAT. *Poultry Sci. 36(4):* 807-815. 1957.—In 7 trials conducted in batteries, up to 33.8% total fat was used in chick starting rations without depressing growth. In some cases, rations containing 30% fat actually supported more rapid growth than was obtained with rations containing lower fat levels. Less feed was required/unit of gain when fat was added, since the high-fat rations contained relatively more nutrients/pound. There was no consistent difference in energy or protein consumed/gram gain when fat was added to practical type rations.—Auth. summ. (Biological Abstracts)

DYMSZA, HENRY (Gen. Foods Res. Center, Tarrytown, N. Y.), **R. V. BOUCHER, and M. G. McCARTNEY.**
INFLUENCE OF FIBER CONTENT AND PHYSICAL FORM OF THE DIET ON THE ENERGY REQUIREMENTS OF TURKEYS. 2. STUDIES WITH GROWING TURKEYS 10 TO 16 WEEKS OF AGE. *Poultry Sci. 36(4):* 914-917. 1957.—Eight groups of 63 ten-week-old White Holland turkeys each were fed ad libitum one of 4 diets, each containing 20% protein but differing in productive energy and fiber content and in energy: protein (E:P) ratio. Each diet was fed in the form of mash and in the form of pellets. The turkeys were reared in confinement and weighed bi-weekly through the 16th week of age. Good growth was obtained on mash diets that contained 639-848 Cal./lb., 5-10% fiber, and E:P ratios of 32 to 42. With pelleted diets satisfactory growth resulted from diets that contained 226 to 848 Cal./lb., 5 to 20% fiber and E:P ratios of 11 to 42. While turkeys were able to make good gains on pelleted diets that contained very low levels of productive energy and low E:P ratios the best feed conversion on either mash or pelleted diets was obtained from the highest energy diet fed.—*R. V. Boucher.* (Biological Abstracts)

ENGELMANN, C. Beiträge über die Verwendung von Antibiotics in Kükenfuttermischungen mit hohem Lupinenanteil.

USE OF ANTIBIOTICS IN POULTRY RATIONS WITH A HIGH PROPORTION OF LUPINS. *Arch. Geflügelzucht Kleintierk.*, 1957, *6*, 147-155. [Inst. Landwirtsch. Versuch., Rostock.] Russian and English summaries.—Earlier work (*Arch. Geflügelzucht Kleintierk.*, 1954, *3*, 395-406; 407-418) showed that sweet lupins are not palatable to poultry and are less well tolerated by hens than by cocks. With penicillin or vitamin B_{12} or both, tolerance was better.

In 1954 the effect of streptomycin and of penicillin was tested on 180 week-old chicks in 6 groups, of which 3 had in their ration 21.5 per cent legume meal with 10.8 per cent sweet lupins and the rest equal parts of peas and field beans, and 6 per cent fishmeal; the other 3 had 33.0 per cent legume meal with half of it sweet lupins and no fishmeal. Within each series of 3 groups, one had 15 mg. streptomycin and one 12 mg. penicillin per kg. meal mixture. In 1955 there were 5 groups, each of 44 chicks on similar rations, 4 with 21 per cent legume meal of which 15 was sweet lupins, and the fifth with only 15 per cent legume meal without lupins and with 5 per cent fishmeal. One group had 12 mg, penicillin, one 2 mg. Citosan, supplying 2 mg. vitamin B_{12} per kg., and one both per kg. meal.

In the first series the antibiotics improved growth on all rations, even that with 6 per cent fishmeal, and especially for female chicks. Cocks did not do well after 4 weeks on any of the rations without animal protein. In the second series all the chicks grew better, possibly because of the inclusion of soya bean meal. Penicillin alone and with vitamin B_{12} improved the ration, but not to the level of fishmeal (Nutrition Abstracts and Reviews)

EVANS, ROBERT JOHN, SELMA L. BANDEMER, J. A. DAVIDSON, and **P. J. SCHAIBLE.** (Michigan State U., East Lansing.)

STUDIES ON THE OCCURRENCE OF PINK WHITES AND SALMON COLORED YOLKS IN STORED EGGS FROM HENS FED CRUDE COTTONSEED OIL OR COTTONSEED MEAL. *Poultry Sci. 36(4):* 798-807. 1957.—Hens fed rations containing 2.5% of crude cottonseed oil produced eggs that after 6 months of cold storage had pink colored whites and enlarged salmon colored yolks. Some pink discoloration of the whites occurred in eggs from hens fed cottonseed meal, but olive yolk discoloration was more common. Carotene at levels of 2 or 4 g, vitamin A acetate at levels of 4 or 8 million units, ferric chloride at levels of 23 or 46 g, or iodine at a level of 10 g/100 lb. of mash did not consistently reduce the incidence of pink whites or salmon yolks. Removal of the soapstock from crude cottonseed oil did not reduce the incidence of discolored eggs, although the soapstock removed caused some. Neither commercial soapstock nor the acidulated soapstock produced any pink-white discoloration but did not produce some olive yolks. Part of the olive yolk factor was extracted with ether. The factor causing pink whites was not extracted with alcohol, but it was destroyed by the heat needed for vacuum distillation.—Auth. Summ. (Biological Abstracts)

FELDMAN, G. L. (Texas Agric. and Mechanical Coll., College Station), **R. L. ATKINSON, B. G. CREECH, T. M. FERGUSON, B. L. REID** and **J. R. COUCH.**

THE EFFECT OF DEHYDRATED ALFALFA MEAL, DRIED BREWERS YEAST AND CONDENSED FISH SOLUBLES ON THE REPRODUCTIVE PERFORMANCE OF TURKEYS. *Poultry Sci. 36(4):* 792-797. 1957.—The hatchability of turkey eggs has been reported to decline from the period of around the 8th to 12th week of the laying season. The period before decline can be extended by supplementing the diet with a number of feedstuffs. In this study, dehydrated alfalfa meal, condensed fish solubles and dried brewers yeast increased hatchability in the period beginning with the 12th week and ending with the 17th week. The hatchability of fertile eggs can be maintained favorably to 24 weeks if the diet is supplemented with condensed fish solubles fed in combination with either dehydrated alfalfa meal or dried brewers yeast.

Two peaks of embryonic mortality were seen in this study. The 1st occurred during the 1st week of incubation and could be reduced by supplementing the diet with dehydrated alfalfa meal, condensed fish solubles and dried brewers yeast. The greatest reduction was seen when condensed fish solubles were fed in combination with dehydrated alfalfa meal or dried brewers yeast. The 2nd peak of embryonic mortality was seen during the 4th week of incubation. The mortality in this period was slightly reduced whenever diets containing condensed fish solubles were fed, but failed to prove statistically significant.—Auth. summ. (Biological Abstracts)

FINDRIK, M. and **F. DUMANOVSKY.** Upotreba krvnog brasna u tovu pilica.

USE OF BLOODMEAL IN THE FATTENING OF CHICKENS. *Vet. Arhiv*, 1957, *27*, 88-94. English and French summaries.—There were 5 groups each of 15 Rhode Island chickens 10 weeks old, fattened for 14 days with feed and water to appetite. All the rations contained maizemeal 20, barleymeal 20 and oatmeal 10 parts; in the control ration the remainder was 10 parts dried milk, and in the first 3 experimental groups one-third, half and all of this was replaced by bloodmeal. The last experimental ration had 10 parts bloodmeal and 0.9 part shellfish shell meal to supply Ca. The crude protein content was 16 per cent in the control ration and rose with increase in the proportion of bloodmeal to about 24 per cent where the meal entirely replaced dried milk. The control ration was low in Ca and replacement of milk progressively reduced the Ca content except in the ration containing shell flour.

The best weight gains were made by the group for which one-third of the milk powder was replaced by bloodmeal. Next came the controls and the group which had equal parts bloodmeal and dried milk. The differences between these groups were not significant. Gains in the two remaining groups were poor, but the Ca supplement gave some advantage. Protein efficiency was highest in the control group, but cost of feed per kg. weight gain was least in the group given 1 part bloodmeal to 2 of dried milk.

It is concluded that bloodmeal should not be used as the sole source of animal protein for chickens, but it can well replace part of the dried milk in rations. (Nutrition Abstracts and Reviews)

FISHER, H., D. JOHNSON (JR.), and **G. A. LEVEILLE.**

THE PHENYLALANINE AND TYROSINE REQUIREMENT OF THE GROWING CHICK WITH SPECIAL REFERENCE TO THE UTILIZATION OF THE D-ISOMER OF PHENYLALANINE. *J. Nutrition*, 1957, *62*, 349-355. [Dept. Poultry Sci., Rutgers Univ., New Brunswick, N. J.]—Day-old chicks were given the free amino acid diet of Fisher and Johnson (Abst. 5947, Vol. 27) supplemented with D-, L- and DL-phenylalanine. Requirement of amino acids was estimated from gain of weight between the 4th and 10th days of age. The minimum requirement of L-phenylalanine was about 0.5 per cent of the diet. D-Phenylalanine was not well utilised, either alone or as the DL-mixture. To obtain a growth response equal to that with 0.25, 0.35 and 0.45 per cent L-phenylalanine, 0.33, 0.55 and 0.76 per cent DL-phenylalanine was required. The requirement of L-tyrosine in presence of 0.46 per cent L-phenylalanine was between 0.3 and 0.5 per cent, and that of L-phenylalanine in absence of tyrosine 1 per cent or slightly more. (Nutrition Abstracts and Reviews)

FOX, M. R. S., G. M. BRIGGS, and **L. O. ORTIZ.**

ACTIVITY OF CERTAIN VIT. B_{12} ANALOGUES IN THE CHICK. *Proc. Soc. Exp. Biol. Med.*, 1957, *95*, 498-500. [Lab. Nutrit. Endocrinol., Nat. Inst. Arthritis Metabol. Dis., Bethesda, Md.]—Day-old chicks were maintained for 4 weeks on a diet of maize and soya bean oilmeal, of high fat content, and were given vitamin B_{12}, the acetato, chloro, nitro or sulphato cobalamin, factor B or the 5-hydroxy analogue. The analogues, dissolved in ethanol, were added to the diet in amounts of 5, 10 or 100 μg. per kg., or diluted with water and given parenterally

in amounts corresponding to those given by mouth. With each amount of any cobalamin, growth was similar to that obtained with the same amount of vitamin B_{12}, no matter whether the compound was in the diet or injected. Cyanide was therefore not required in the molecule for full vitamin B_{12} actviity. The 5-hydroxy analogue had 1/10 to 1/3 of the activity of vitamin B_{12}, and factor B had no significant effect on growth. The effect of vitamin B_{12} analogues on growth in the chick is closely related to their anti-pernicious-anaemia activity in man. (Nutrition Abstracts and Reviews)

GILLIS, M. B., K. W. KEANE, and **R. A. COLLINS.**
COMPARATIVE METABOLISM OF PHYTATE AND INORGANIC P^{32} BY CHICKS AND POULTS. *J. Nutrition,* 1957, *62,* 13-26. [Gen. Res. Lab., International Minerals and Chemical Corporation, Skokie, Ill.]—Chicks and poults were given for 5 weeks a diet with adequate vitamin D or none and then received by mouth Ca phytate labelled with ^{32}P or $Na_2H^{32}PO_4$. The radio-activity of plasma and ash of tibia showed that in normal chicks utilisation of ^{32}P from inorganic P was 10 times that from a comparable amount of phytate P, and vitamin D deficiency still further reduced utilisation of phytate P. Plasma of deficient chicks contained slightly more inorganic P than plasma of normal birds, which indicated that vitamin D deficiency does not impair utilisation of inorganic P. Turkey poults, whose P requirement is higher than that of chicks, utilised little or no phytate P. Their utilisation of inorganic P was slightly impaired by vitamin D deficiency. Excretion of ^{32}P by both normal and deficient chicks and poults was considerably greater with phytate than with inorganic P. In studies of chemical exchange *in vitro* ^{32}P from $Na_2H^{32}PO_4$ exchanged readily with P from Ca phytate. (Nutrition Abstracts and Reviews)

GOSWAMI, N. D., A. R. ROBBLEE, and **L. W. McELROY.** (U. Alberta, Edmonton, Canada.)
CYSTEINE DESULFHYDRASE ACTIVITY IN CHICK LIVER. *Arch. Biochem. and Biophys. 70(1):* 80-86. 1957—A study of the concentration of liver cysteine desulfhydrase of chicks indicates that age and nature of the ration may have a marked effect on the activity of the enzyme. The level of cysteine desulfhydrase activity present in the liver of the newly hatched chick is high, followed by a rapid decline in activity during the first 7 days after hatching, with the level of activity remaining relatively constant thereafter. A deficiency of pyridoxine in the ration resulted in a decline in cysteine desulfhydrase activity between 7 and 14 days of age to a level approximately one-half of that found in chicks receiving pyridoxine. High levels of cysteine desulfhydrase activity, comparable to those found in the livers of newly hatched chicks, were maintained or restored in chicks fed either an egg ration or simulated egg rations.—Authors. (Biological Abstracts)

HAVERMANN, H., R. M. WEGNER, and **W. HARTFIEL.** Hähnchenmast- und Ausschlachtungs-versuche mit verschiedenen Rassen und Kreuzungen.
FATTENING AND CARCASE STUDIES ON COCKERELS OF DIFFERENT BREEDS AND CROSSES. *Arch. Geflügelk.,* 1957, *21,* 170-191. [Inst. Tierzucht, Univ. Bonn.] English summary.—Cockerels of 7 different breeds and crosses were maintained in battery cages and given for 12 weeks an all-mash ration containing, per cent, protein 22 and crude fat 3.3. White Leghorns were least satisfactory for profitable broiler production. Weight gains and feed utilisation were lower and dressing losses and cost of feed per g. weight increase higher than in any of the other breeds. The best results were obtained with New Hampshires, followed by Light Sussex and Rhode Island×Sussex and New Hampshire×White Leghorn crosses. Percentage of edible meat increased, in general, from 8 to 12 weeks of age. Percentage of crude protein in the carcase remained constant throughout the period, but crude fat decreased at 12 weeks. The results were influenced to some extent by date of hatching and position of cages in the battery. (Nutrition Abstracts and Reviews)

HEYWANG, BURT W. (U. S. Dept. Agric. Glendale, Arizona.)
FAILURE OF FERROUS SULPHATE TO INACTIVATE FREE GOSSYPOL IN DIETS FOR LAYING CHICKENS. *Poultry Sci. 36(4)* 715-718. 1957.—In a series of 4 experiments laying White Leghorn pullets were fed diets containing 0.25 or 0.50% ferrous sulfate along with screw-press, prepress solvent-extracted, or hydraulic cottonseed meal as the source of free gossypol at levels varying from 0.002 to 0.022%. Some yolks of fresh eggs laid by the pullets were subjected to the ammonia test and the others were held in storage at temperatures of 35 or 50-55 degrees F for about 3, 4.5, or 6 months, and their yolks then examined for the discolorations attributable to gossypol. Some yolks were discolored even when 0.50% ferrous sulfate was in the diet along with only 0.002% free gossypol.—*B. W. Heywang.* (Biological Abstracts)

HEYWANG, BURT W. (U. S. Dept. Agric. Glendale, Arizona.)
THE RELATIVE EFFECT OF TWO HIGH LEVELS OF AN ANTIBIOTIC ON LAYING CHICKENS DURING HOT WEATHER. *Poultry Sci. 36(4)* 871-873. 1957.—An all-mash diet supplemented with chlortetracycline at the levels of 0, 50, and 100 g, respectively/ton of diet was fed to groups of laying White Leghorns during 3 periods of 112 days each. Each diet was fed to the same 2 groups during only 1 of the 112-day periods. Egg production was greater, and the quantity of diet consumed/dozen eggs laid was lower, during hot weather in the groups fed the supplement, but there was little difference in the effect of the 2 levels.—*B. W. Heywang.* (Biological Abstracts)

HILL, C. H., A. D. KEELING, and J. W. KELLY.
STUDIES ON THE EFFECT OF ANTIBIOTICS ON THE INTESTINAL WEIGHTS OF CHICKS. *J. Nutrition,* 1957, *62,* 255-267. [Dept. Poultry Sci., N. Carolina State Coll., Raleigh.]—Chickens were given a basal maize and soya bean ration with or without chlortetracycline. They were killed at intervals and the intestines, from the gizzard to the attachment of the caeca were freed from their contents and weighed. The antibiotic, 100 mg. per lb. diet, increased bodyweight and reduced the weight of the small intestine during the first 4 weeks, but at 5 weeks a reduction was less evident. The intestine appeared to be more rapidly affected by the antibiotic than was bodyweight. When penicillin, from 2 to 100 mg. per lb., was added to a casein and cerelose or maize and soya bean diet the weight of the intestine was decreased by amounts of antibiotic too small to affect bodyweight. Inclusion in the diet of fibrous materials, alfalfa or wheat bran, did not increase the weight of the intestine or affect its response to penicillin. The retardation of growth and increase of relative intestinal weight caused by inclusion of 10 per cent untreated soya bean meal in the diet was completely counteracted by penicillin, but with 30 or 40 per cent penicillin was not entirely effective. A casual relation between the effect of antibiotics on the small intestine and stimulation of growth which they produce seems doubtful. (Nutrition Abstracts and Reviews)

HIXSON, O. F. and L. ROSNER. (Lab. Vitamin Technol., Chicago.)
CALCIUM IODATE AS A SOURCE OF IODINE IN POULTRY NUTRITION. *Poultry Sci. 35(4):* 712-714, 1957.—Calcium iodate was compared to KI as a goiter-preventing agent for chicks. Evaluation of effectiveness was based on thyroid weight and thyroid activity, as determined by histological examination. The 2 compounds were equivalent. (Biological Abstracts)

HOGAN, A. G., R. W. CRAGHEAD, J. E. SAVAGE, J. J. COLE and B. L. O'DELL.
CASEIN AS A SOURCE OF PROTEIN FOR THE CHICK. *J. Nutrition,* 1957, *62,* 97-106. [Dept. Agric. Chem., Coll. Agric., Univ. Missouri, Columbia.]—Chicks were given a basal diet containing, per cent, casein 35, glucose 46.5, cellulose 3, soya bean oil 10, salts 5, methio-

nine 0.5 and a vitamin mixture, or this diet with 10 per cent gelatine replacing an equal amount of cellulose. Chicks on the ration containing gelatine showed only moderate and very variable growth. Supplementation with 1.5 per cent glycine improved growth slightly but not consistently. Maximum growth was obtained when 1 per cent arginine or 1.5 per cent creatine was added. Casein as sole source of dietary protein gave unsatisfactory growth because of deficiency of arginine, but this deficiency was corrected by supplements of arginine, the optimum arginine content of the diet being between 1.8 and 2.5 per cent. When 1.5 per cent glycine also was added there was a slight acceleration of growth. The data showed that when casein, or casein and gelatine, are appropriately supplemented with amino acids, rapid rates of growth about equal to that with soya bean oilmeal as source of protein can be obtained. (Nutrition Abstracts and Reviews)

JENSEN, LEO S., RAMON E. FRY, JOHN B. ALLRED, and JAMES McGINNIS. (State Coll. Washington, Pullman.)

IMPROVEMENT IN THE NUTRITIONAL VALUE OF BARLEY FOR CHICKS BY ENZYME SUPPLEMENTATION. *Poultry Sci. 36(4):* 919-921. 1957.—Diets containing barley have consistently depressed growth and feed efficiency of chicks when compared to results obtained with diets containing corn. The addition of a fungal enzyme preparation was tried as a means of overcoming the depressed growth and feed efficiency of chicks fed this grain. The enzyme supplement used improved the nutritional value of the pearled barley so that it was essentially equal to corn for support of chick growth and feed utilization. —*James McGinnis.* (Biological Abstracts)

KLAIN, G. J., D. C. HILL, and H. D. BRANION. (Ontario Agric. Coll., Guelph, Ont., Canada.)

EFFECT OF LYSINE-DEFICIENCY ON HEMATOPOIESIS IN THE CHICK, INCLUDING OBSERVATIONS ON FOLIC ACID DEFICIENCY. *Poultry Sci. 36(2):* 405-410. Illus. 1957.—Barred Plymouth Rock cockerels, when fed a lysine-deficient diet based on sunflower seed oil meal, showed at 4 weeks of age an achromatosis of the feathers and macrocytic anemia, mildly hypochromic, with leukopenia and thrombopenia. The development of the anemia was not caused by the reduced feed consumption of the birds receiving the deficient diet. Achromatosis of the feathers and a similar blood condition at 10 weeks of age was found in birds fed a diet for which the protein supplement was a mixture of dried buttermilk and fish meal. The symptom in this case did not appear if the diet was supplemented with folic acid. It is suggested that folic acid and lysine may be related in their role in feather pigmentation.—*D. C. Hill.* (Biological Abstracts)

KORN, E. D. and T. W. QUIGLEY (JR.)

LIPOPROTEIN LIPASE OF CHICKEN ADIPOSE TISSUE. *J. Biol. Chem.*, 1957, *226*, 833-839. [Lab. Cellular Physiol. Metabol., Nat. Heart Inst., Nat. Insts. Health, Bethesda, Md.]—Frozen chicken adipose tissue was defatted with acetone and the resulting fibrous material was exacted with weak ammonia solution. The insoluble material was removed by centrifuging and the supernatant solution was freeze-dried to give a lipoprotein lipase preparation in a yield of about 4 g. from 5 lb. fat. The activity of the enzyme was tested with a commercial coconut oil emulsion and the same emulsion after incubation with normal human plasma, which results in formation of particles similar to low-density β-lipoproteins.

The triglyceride of the artificial lipoprotein was hydrolysed by the enzyme much more rapidly than was the untreated emulsion. Formation of an enzyme-substrate complex before hydrolysis was demonstrated. The hydrolytic step was shown to require the presence of one of several divalent cations or NH_4^+. The enzyme was inhibited by protamine sulphate and heparin. (Nutrition Abstracts and Reviews)

KURNICK, A. A., B. L. REID, R. N. BURROUGHS, H. D. STELZNER, and J. R. COUCH.

EFFECT OF DISTILLERS DRIED SOLUBLES AND MOLYBDENUM ON THE GROWING CHICK. *Proc. Soc. Exp. Biol. Med.*, 1957, *95*, 353-356. [Dept. Poultry Sci., Texas Agric. and Mech. Coll. System, College Station.]—When chicks were given a basal ration supplying 1.16 p.p.m. Mo, supplements of 3 per cent. dried distiller's solubles, Mo as 0.3 or 0.03 per cent sodium molybdate, or a mixture of unidentified growth substances, significantly increased growth. The supplemented groups had from 1.21 to 1.51 p.p.m. Mo in all. The ash of 3 per cent dried distiller's solubles increased growth, but not significantly, and the ash treated to remove Mo slightly depressed growth. The supplements did not affect percentage bone ash or Mo content of ash or whole blood. Mo content of the liver was signficantly increased by the ash of dried distiller's solubles, the higher level of sodium molybdate and the unidentified growth substances, and non-significantly by the other supplements, except the treated ash of solubles. The supplements which stimulated growth also increased xanthine dehydrogenase activity of the liver and intestine significantly, and that of intestine was increased by the ash of distiller's solubles also. The difference in response of liver and intestine to the ash is discussed. A positive correlation of 0.617 was found between xanthine dehydrogenase activity and Mo content of the liver. (Nutrition Abstracts and Reviews)

LAERDAL, OSM. A., P. M. NEWBERNE, J. E. SAVAGE, and B. L. O'DELL. (U. Missouri, Columbia.)

A DIRECT METHOD FOR DETERMINATION OF DIGESTIBILITY IN GROWING CHICKENS. *Poultry Sci. 36(4):* 815-820. 1957. —An operative technique, which involved exteriorizing the ureters and thus allowed quantitative and separate collection of urine and feces, was applied to growing chickens. The digestibilities of the proximate nutrients of a purified type diet were 10 to 20% higher than those of a practical type diet. The metabolizable energy of the practical, corn-soybean meal diet was 74.5% of the gross energy. Nitrogen retention on a purified diet that contained 35% of casein as the source ofg protein was 32% of that consumed. The addition of arginine or of gelatin increased the retention to 41 to 46%, respectively. Values for endogenous and metabolic nitrogen were determined by feeding a nitrogen-free diet and were used in the calculation of biological value.—Auth. summ. (Biological Abstracts)

LAKSESVELA, B. Antibiotika in ihrer Beziehung zu Heringsmehl in der Kükenfütterung.

ANTIBIOTICS COMPARED WITH HERRINGMEAL IN CHICKEN FEEDING. *Arch. Geflügelk.*, 1957, *21*, 106-117. English summary.—Day-old chickens received basal diets containing only vegetable protein or a combination of vegetable protein and herringmeal, with or without antibiotics. Supplementation with antibiotics improved growth on both types of diet for the first 4 weeks, but subsequently the effect was negligible. After 6 weeks of age, the herringmeal diets, with or without antibiotics, gave better growth than the vegetable protein rations. When basal diets similar but containing 16 and 25 per cent protein were used, the beneficial effect of herring meal or of aureomycin or penicillin was increased when these substances were given in combination. Penicillin and herringmeal gave the greatest response when the ration was low in protien, aureomycin and herringmeal when it was high. Growth on diets containing 1, 2, 4 or 8 per cent herringmeal was improved by penicillin. The use of herringmeal or antibiotics, or both combined, improved feed utilisation and reduced mortality. The interrelation between antibiotics and animal protein is discussed. (Nutrition Abstracts and Reviews)

LANDAU, L. and A. SPRONC. β-Karoténu v zelnom krmive na uzitkovost a zdravotny stav hrabavej hydiny.
THE EFFECT OF A CONSTANT SUPPLY OF β-CAROTENE IN GREEN FODDER ON PRODUCTION AND HEALTH OF POULTRY. *Polnohospodarstvo*, 1956, *3*, 61-80. [Res. Inst. Poultry Breeding, Ivanka pri Dunaji, Czechoslovakia.] German and Russian summaries.—Of 2 groups of 280 White Leghorn chickens, hatched in March, one received green fodder, silage and fodder carrots from 2 days of age to 14 months. The second group was given for the same time a standard ration for chickens and had free access to pasture. The first group showed uniformly greater weight gain, better yield of eggs in number and weight, better health and earlier maturity. The fertility of the eggs laid by the first group up to April was from 5 to 20 per cent higher than in the second group. In April hatchings the difference disappeared.

During the experiment diphtheria broke out in both groups with less morbidity and mortality in the first group; loss in the first group was 9.11, in the second 36.15 per cent. The favourable effect it attributed to the constant supply of carotene. (Nutrition Abstracts and Reviews)

LAUFFER, ROBERT G. (Pennsylvania State U., University Park.)
THE EFFECT OF CAPONIZING AND ESTROGEN TREATMENTS ON THE PERFORMANCE OF NEW HAMPSHIRE COCKERELS. *Poultry Sci. 36(2):* 376-377. 1957.—New Hampshire cockerels treated with diethylstilbestrol (DS) and dienestrol diacetate (DD) were significantly heavier at 24 weeks of age than untreated and surgically caponized birds. At 13 weeks only DD treated birds were significantly heavier. Yields of the eviscerated carcass of DS and DD treated birds were also significantly higher at 24 weeks of age. DS and DD treated birds were vastly superior in finish, feathering, and fleshing at both 13 and 24 weeks of age and tended to use feed more efficiently.—*R. G. Lauffer.* (Biological Abstracts)

LILLIE, ROBERT J., J. R. SIZEMORE and **C. A. DENTON.** (Agric. Res. Service, Beltsville, Maryland.)
EFFECT OF AN ARSENICAL, FAT AND ANTIBIOTIC UPON THE REPRODUCTIVE PERFORMANCE OF CHICKENS. *Poultry Sci. 36(4):* 755-759. 1957.—Studies were conducted over a 3-year period with dual-purpose breeds of chickens to determine the nutritional significance of an arsenical, fat and antibiotic upon the laying house performance and progeny performance. The crude arsenilic acid supplement containing 20% arsenilic acid was fed at the 0.05% level; the pure arsenilic acid at 0.01 and 0.005% levels; stabilized lard at 4% level; antibiotic feed supplement containing 4 g procaine pencillin G/lb. at 0.05% level. Irrespective of the level used, these 3 ingredients fed singly or in combination did not influence egg production, fertility or hatchability. The incorporation of fat in laying diets, irrespective of arsenical or antibiotic, lowered the feed requirement/dozen eggs. Generally speaking, the body weight maintenance was improved by the addition of an arsenical, fat and antibiotic singly or in combination. Out of 26 possible comparisons with progeny performance studies, only 1 produced a growth increase that was highly significant, namely, the combination of fat and crude arsenilic acid. This significant growth response was not seen in subsequent experiments.—Auth. summ. (Biological Abstracts)

LöHLE, K. Untersuchungen über die Wasseraufnahme bei Legehennen.
WATER DRUNK BY LAYING HENS. *Arch. Geflügelzucht Kleintierk.*, 1957, *6*, 141-146. [Inst. Tierzucht, Friedrich Schiller Univ., Jena.] Russian and English summaries.—Estimates from the literature are reviewed.

Records were kept from 1 January to 15 September 1955 of the water drunk by 150 hens, 70 Brown Leghorn, 70 White Leghorn and 10 Rhode Island Red. All had, daily, 50 g. grain, 20 sprouted oats, 20 barley and 10 maize; and 25 g. of a layers' meal (see Abst. 1596, Vol. 28)

moistened and the same meal dry to appetite. Least water was drunk in February, 138 ml. per head daily, and most in April and May, 183 and 187 ml., the amount following closely changes in egg yield, 12.8 per head monthly in February and 22.9 and 23.1 in April and May; absolutely and relatively more in these months. (Nutrition Abstracts and Reviews)

McDANIEL, A. H. (Texas Agric. and Mechanical Coll. System, Coll. Sta.), **J. D. PRICE, J. H. QUISENBERRY, B. L. REID,** and **J. R. COUCH.**

EFFECT OF ENERGY AND PROTEIN LEVEL ON CAGE LAYERS. *Poultry Sci. 36(4):* 850-854. 1957.—Single Comb White Leghorns, DeKalb, and Hyline strains were used in these studies. The birds were housed in laying cages at the onset of egg production and fed diets containing 17 and 18% protein with Calorie levels of 962 and 1050 Calories of productive energy/pound at each protein level. The higher energy diet (1050 Calories/pound) increased feed efficiency, as measured by feed required/dozen eggs produced, by 12.2%. At the 18% protein level the higher energy diet resulted in an 8.2% reduction in feed consumption/dozen eggs compared to the 962 Calorie-18% protein diet. An increase in protein from 17 to 18% produced a 6% improvement in feed conversion. Liver fat analyses indicated that birds housed in cages had a higher amount of liver fat than comparable birds housed on litter. Non-laying birds maintained in cages exhibited higher liver fat than laying birds of the same strain on the same diet. A marked increase in serum cholesterol content was found in non-laying cage birds compared to those in production. Birds housed in cages exhibited higher cholesterol levels than floor-housed controls. Increased energy content of the diet at the same protein level caused an increase in cholesterol, while an increase in protein of 1% reduced the serum cholesterol level. —Auth. summ. (Biological Abstracts)

McDONALD, M. W.

METHIONINE SUPPLEMENTS IN CHICKEN DIETS. 1. EFFECT OF SUPPLEMENTARY METHIONINE AND CHOLINE ON GROWTH AND FOLIC ACID REQUIREMENTS OF WHITE LEGHORN CHICKENS. *Austral. J. Agric. Res.*, 1957, *8*, 318-324. [Dept. Agric., Poultry Exp. Stat., Seven Hills, N.S.W.]—1. Day-old chicks were given a basal diet mostly of wheatmeal, meatmeal and whey powder. Folic acid added to this diet did not improve growth, but 0.2 per cent DL-methionine increased it by 12 per cent and methionine and folic acid together by 20 per cent. When the basal diet was supplemented with 0.066 per cent choline chloride, growth was significantly depressed, but not when folic acid, 4 p.p.m., was given also. Growth was improved by methionine, choline and folic acid together. The implication is that the basal diet was inadequately supplied with sulphur amino acids, but not with labile methyl groups. Since methionine or choline added to the basal diet increased the folic acid requirement, folic acid may be concerned in the catabolism of surplus methyl groups. (Nutrition Abstracts and Reviews)

McDONALD, M. W. (U. Sydney.)

METHIONINE SUPPLEMENTS IN CHICKEN DIETS. II. A BREED DIFFERENCE IN GROWTH RESPONSE TO DL-METHIONINE. *Australian Jour., Agric. Res. 8(5):* 587-594. 1957.—In four experiments, White Leghorn chickens showed a highly significant ($P<0.01$) greater response in early growth following addition of DL-methionine to a practical basal diet, than Australorp chickens. Average increases in body weight were: White Leghorns, 10.95 per cent; Australorps, 2.0 per cent. In crosses between these breeds, it was shown that the differences between the breeds can be explained by a single sex-linked gene or group of genes, dominant in White Leghorns. Possible biochemical bases for the breed difference are discussed.—Auth. summ. (Biological Abstracts)

McLOUGHLIN, D. K., E. E. WEHR, and R. RUBIN. (Agric. Res. Service, Beltsville, Maryland.)
EGG SHELL COLOR AND EGG PRODUCTION IN NEW HAMPSHIRE LAYING HENS AS AFFECTED BY NICARBAZIN MEDICATION. *Poultry Sci. 36(4):* 880-884. 1957.—Nicarbazin was fed to New Hampshire laying hens in order to determine the effect of this anticoccidial drug on the number, shell color, shell thickness, interior quality, and weight of eggs produced. After 3 days on the drug the hens began to produce white instead of brown eggs. The treated hens continued to lay white eggs for 2 days following the withdrawal of the drug, after which the brown coloration began to return. The number of eggs produced by the hens during the 2nd week of treatment was only ½ that produced by the controls. This difference in egg production was maintained until more than a week after nicarbazin was discontinued. No significant differences were observed in weight, shell thickness, or interior quality of the eggs produced by treated and untreated hens.—*D. K. McLoughlin.* (Biological Abstracts)

MacINTYRE, T. M.
VARIABILITY IN THE NUTRITIVE VALUE OF FISH MEALS FOR GROWING CHICKENS. *Canad. J. Animal Sci.*, 1957, *37*, 58-63. [Div. Poultry Husb., Exp. Farms Serv., Canada Dept. Agric., Nappan, N.S.] Six chick growth trials are reported in which 40 different samples of commercial fishmeals, white, red or oily, or mixtures of these, were tested. A basal mixture with 12 per cent protein was used, and from this a control ration with added soya bean oil meal and white fishmeal in equal quantities was made up to supply 18 per cent crude protein. In the test rations the fishmeal under investigation was added to give the same level of protein. The rations were given from 10 days to 6 weeks old. Growth on the test meals was from 81 to 106 per cent of that of controls. In one trial with samples of different batches of the same brand, growth varied from 88 to 96 per cent of that of controls. Rations made up from different sacks of the same delivery did not vary in growth produced. The fishmeals had crude protein contents ranging from 51.6 to 69.2 per cent. There was no correlation between these and the growth obtained. Possible reasons for the variation in quality of the protein, which it was concluded was the reason for the different growth rates, are discussed. (Nutrition Abstracts and Reviews)

MACHLIN, L. J. and P. B. PEARSON
METABOLISM OF TAURINE IN THE GROWING CHICKEN. *Arch. Biochem. Biophys.*, 1957, *70*, 35-42. [Animal Husb. Res. Branch, Agric. Res. Serv., U.S. Dept. Agric., Beltsville, Md.]—Taurine-^{35}S was isolated from protein-free filtrates from chicks recently hatched from eggs which had been injected with 460 μC. $Na_2{}^{35}SO_4$ after 10 days' incubation. Female crossbred chicks were fed on a purified diet of casein and gelatine containing 0.74 per cent methionine, 0.06 per cent cystine and no inorganic S. When 3 weeks old these chicks were injected intramuscularly with 25 mg. taurine-^{35}S. Excreta were collected daily for 9 days and examined for ^{35}S. After one day 16 per cent of the ^{35}S was recovered and after 9 days 39 per cent. Some of the birds were killed after one day and their tissues were dissected and weighed and radioactivity was measured. Percentages of the administered dose per g. fresh tissue were in heart 1.37, duodenum 0.91, spleen 0.81 and gizzard muscle 0.69. Other organs contained smaller amounts. Traces only of ^{35}S were recovered from the protein fraction of the tissue. Small amounts were found in the bile acid fraction, but most was found in protein-free extracts. In the gall bladder 96.7 per cent was found in the bile acid fraction. The radio-activity of all the extracts was largely in taurine, but in liver and kidneys a conjugate containing taurine accounted for a large proportion.

In further experiments taurine-^{35}S was given in capsules by mouth. Taurine, bile acids, sulphate, unidentifiable compounds and a compound similar to the taurine conjugate found in the tissues then accounted for

80, 4, 2, 7 and 7 per cent of the ^{35}S recovered in the excreta. Acid hydrolysis of the conjugate yielded ornithine and several other ninhydrin-reactive compounds in addition to taurine. Excretion of ^{35}S was reduced when arginine was given at the same time as labelled taurine. (Nutrition Abstracts and Reviews)

MACHT. Antibiotika und Vitamine im Hühnerfutter.
ANTIBIOTICS AND VITAMINS IN LAYERS' RATIONS. *Deutsch. Wirtschaftsgeflügelzucht*, 1957, *9*, 412-413. [Kitzingen.]—Previous experiments indicated that rations for growing and laying birds with 20 per cent of a mixture of plant and animal proteins supplemented by antibiotics gave as good results as rations with 15 per cent of high quality animal protein and were more economical. Hatchability also was increased by antibiotics. These results were confirmed and extended in the present experiments and the costs of the rations per bird and per egg were estimated. A supply of Ca and natural or synthetic vitamins is essential. (Nutrition Abstracts and Reviews)

MEHNER, A., H. W. HOHLS and **J. SOMMERFELD.** Untersuchungen über die Mastfähigkeit und Futterausnutzung verschiedener Hühnerrassen und deren Kreuzungen.
FATTENING CAPACITY AND FEED UTILISATION OF DIFFERENT BREEDS OF POULTRY AND THEIR CROSSES. *Arch. Geflügelk.*, 1957, *21*, 217-235. [Bundesforschungsanst. Kleintierzucht, Celle.] English summary.—Two trials are reported, in each of which chicks of 5 breeds or crosses in groups of 25 males or 25 females, 750 in all, were fattened in batteries from day old to 12 weeks on one of 3 meals, containing 21, 18.6 or 16.1 per cent crude protein. The high-protein meal was fishmeal 12.7, soya grits 10, oats 15, maize 14, wheat 15, hulled barley 15, wheat feed 9.3, lucerne meal 4, wheat germ 2, minerals 3 per cent and vitamins; the others consisted of 86 per cent of this meal and 14 per cent potato starch, and 70 per cent meal with potato starch 25 and ground oat husks 5 per cent., both with additional minerals and vitamins.

The results are tabulated for each trial. Breed and sex differences were clear, but it was also clear that the orders of merit for feed efficiency and for profit were not the same, and were different with the different feeds. Further, the order for efficiency at 12 weeks differed from that at 8 weeks.

It was concluded that tests of suitability for production of broilers are necessary and should be made with at least 3 different levels of protein, but for a first screening one diet resembling the high-protein mixture of these trials could be used. Because of differences in consumers' desires, tests should be based on achievement of at least 2 different weights, not on a period of time. A simple formula for estimating profits at weights below slaughter weight is given. (Nutrition Abstracts and Reviews)

MILLER, E. C., M. L. SUNDE, and **C. A. ELVEHJEM.** (U. Wisconsin, Madison.)
MINIMUM PROTEIN REQUIREMENT OF LAYING PULLETS AT DIFFERENT ENERGY LEVELS. *Poultry Sci. 36(4):* 681-690. 1957.—Four experiments were conducted with Single Comb White Leghorn pullets kept in laying batteries to study minimum protein requirements at different energy levels. The experimental periods varied from 12 to 18 weeks. Egg production, body weight and feed efficiency data were obtained. The protein levels of the diet ranged from 10 to 21%, while the calories of productive energy/pound of diet was varied from 640 to 1075. Good egg production was still obtained when the protein level of the diet was reduced to 12.5-13%. Changing the level of energy in the diet did not affect egg production at the various levels of protein used in the experimental diets. Addition of white grease to the diet resulted in a decrease in the amount of feed required to produce a dozen eggs. Although the calories of productive energy of the diets ranged from 31 to 86 for each percent protein, good egg production was

obtained during the experimental periods. It appears that the calorie-protein ratio of the diet of laying pullets is not as critical as for the growing chick.—Auth. summ. (Biological Abstracts)

NABER, EDWARD C. (Ohio State U., Columbus), **H. R. BIRD, and C. L. MORGAN.**

NUCLEIC ACIDS AS GROWTH FACTORS FOR THE FOLACIN DEFICIENT CHICK. *Poultry Sci. 36(3):* 480-485. 1957.—Experiments were conducted to determine the effects of nucleic acids and their derivatives on the growth of folacin-deficient chicks. Day old chicks were fed a folacin-deficient purified ration for 1 week, then divided into groups and fed experimental rations for a 12-day period. Supplements of several nucleic acids produced improved weight gains on rations containing a minimum quantity of folacin. In 3 experiments graded levels of folacin fed with and without DNA showed that the increased chick gains upon nucleic acid supplementation were obtained only when the chicks were partially folacin deficient. Comparison of crystalline thymidine and hypoxanthine with nucleic acid in 3 additional trials indicated that a combination of the pure components was as effective as the nucleic acid preparations in promoting weight gains of folacin limited chicks. Neither the pure compounds nor the nucleic acids improved growth when the chicks received adequate folacin. The results support the hypothesis that folacin is involved in the biosynthesis of nucleic acid derivatives, and also that the reduced folacin requirements observed for chickens fed semi-practical rations may be due to their content of nucleic acid.—*E. C. Naber.* (Biological Abstracts)

NABER, EDWARD C. (Ohio State U., Columbus.), and **CHARLES L. MORGAN.**

FAT SUPPLEMENTATION OF CHICK STARTING RATIONS CONTAINING COTTONSEED MEAL. *Poultry Sci. 36(4):* 727-732. 1957.—With the substitution of cottonseed meal for soybean meal in broiler rations feed/pound of gain is increased. Addition of white grease at levels at 2% and 4% to the cottonseed meal supplemented rations reduced the feed required/pound of gain making these rations comparable in feed efficiency to the soybean meal supplemented rations. Poultry grease, crude cottonseed oil, and cottonseed soapstocks were equally as effective as white grease in improving the feed efficiency of the cottonseed meal supplemented rations.—Auth. summ. (Biological Abstracts)

NEWBERNE, P. M., and **G. L. McEUEN.** (U. Missouri, Columbia.)

STUDIES ON DRUG TOXICITY IN CHICKS 4. THE INFLUENCE OF VARIOUS LEVELS OF NITROFURAZONE [NFZ] ON GROWTH AND DEVELOPMENT OF CHICKS. *Poultry Sci. 36(4):* 739-743. Illus. 1957.—NFZ in concentrations of 0.0125% to 0.10% was fed to chicks for a period of 8 weeks. Growth depression and histological changes occurred in birds on levels of 0.05% and above. Clinical symptoms of deficiencies of the B-complex vitamins were observed including polyneuritis and curled toe paralysis. Histological changes included pulmonary exostosis, atrophy of the bursa of fabricus and renal tubular degeneration.—Auth. summ.

NEWBERNE, P. M., and **G. L. McEUEN.** (U. Missouri, Columbia.)

STUDIES ON DRUG TOXICITY IN CHICKS 5. THE INFLUENCE OF VARIOUS LEVELS OF DPPD ON GROWTH AND DEVELOPMENT OF CHICKS. *Poultry Sci. 36(4):* 744-747. Illus. 1957.—N,N^2-diphenyl-p-phenylenediamine (DPPD) was given in the feed to chicks at levels from 0.0125% to 0.10%. Microscopic lesions in the liver, kidney and bursa of Fabricus were detectible at levels of 0.05% and above however, they were mild in nature. Growth was not significantly affected at any of the levels used and the blood picture remained unchanged in those constituents examined.—Auth. summ. (Biological Abstracts)

OBRADOVIC, M. Iskoriscavanje otpadaka domace proizvodnje penicilina za ishranu pilica.

THE USE OF RESIDUES FROM HOME PRODUCTION OF PENICILLIN FOR FEEDING CHICKENS. *Veterinaria, Sarajevo*, 1957, *6*, 82-89. [Inst. Stočarstvo NRS, Zemun Polje.] English summary.—Residues of penicillin mycelium obtained from a local factory were divided into 2 lots, one stored in the refrigerator, the other dried at about 55° C. and then stored in a dry place. Of 3 groups of 50 chickens, fed to appetite, one group served as controls and the others received supplements of fresh or dry residues. The experiment lasted 60 days. The basal ration was of maize, barley and oats, skimmed milk, baker's yeast, meatmeal, lucerne meal and minerals, with supplements of the vitamin preparation Dohyfral. [The proportion of residue used is not clear.]

The mean composition of the fresh residues was moisture 76, crude protein 7, crude fat 4, crude fibre 0.76, N-free extract 5 and minerals 7 per cent. The dried sample contained moisture 8.4, crude protein 25, crude fat 16, crude fibre 3, N-free extract 21.5 and minerals 26 per cent. In the 60 days the groups given fresh and dried residues gained, respectively, 15.5 and 11.1 per cent more weight than the controls; dry matter consumption per kg. weight gain in the controls and experimental groups was 5.41, 4.88 and 5.13 kg. In no group was gain satisfactory, but this is ascribed to the small cages used.

It is considered that penicillin residues of domestic origin could well be used for poultry feeding in Jugoslavia, preferably in the fresh form. (Nutrition Abstracts and Reviews)

OLSSON, N. Försök rörande orsaken till svaga skal pa hönsägg.

INVESTIGATIONS ON LAYING HENS IN ORDER TO STUDY THE CAUSES OF VARIATION IN EGG SHELL QUALITY. *Kungl. Lantbrukshögsk. Husdjurförsök Medd.* No. 64, 1957, pp. 19. English summary.—In experiments from October to May in successive years White Leghorn hens during the first season of laying received mash to appetite and 55 to 60 g. whole grain daily. The giving of limestone grit alone or with granite grit, a daily supply of 2.87 or 4.24 (3.21 or 4.86 in second year) I.U. vitamin D per g. feed, presence of 2.00 or 1.40 (2.15 or 1.45 in second year) per cent Ca, keeping the hens indoors or outdoors, and inclusion of 10 g. penicillin per ton feed caused no difference in egg production or percentage shell weight as measured by sp. gr. The latter fell throughout the experimental period and was the same in all groups; the considerable individual variations were attributed to heredity. (Nutrition Abstracts and Reviews)

OPICHAL, M., H. BARAKOVA, and F. MUSIL. 1957. [Res. Inst. Nutr., Agric. Coll., Brno.] Učinky stilbestrolu pri dokrmu hus.

THE EFFECT OF STILBOESTROL IN FATTENING GEESE. *Sborn, csl. Akad. Zemed. Ved, Zivoc. Vyr., 2 (30):* 459-466. [Russian and English summaries.]—Whole or broken stilboestrol tablets were implanted subcutaneously in the neck of 2 groups resp. each of 9 Bohemian White geese; a 3rd group of 9 geese served as controls. After 4 wks. the av. body weight of geese in the 2 experimental groups was 370 and 252 g. resp. greater than that of the controls; similar differences occurred in the dressed carcass and in the weights of fat and internal organs. None of the differences was statistically significant except that thyroid weight was significantly lower in the experimental groups compared with the control group. Correlations between the amount of oestrogen absorbed and each of the characters studied were not significant. (Animal Breeding Abstracts)

PODHRADSKY, J. 1957. [Agric. Coll., Brno.] Nejvhodnejsi zpusob vykrmu kohoutku v JZD.

ECONOMIC CHARACTERS OF COCKERELS FATTENED AT JZD [Agricultural Co-operatives]. *Sborn. csl. Akad. Zemed. Ved, Zivoc. Vyr., 2 (30):* 433-448. [Russian and German summaries.]—In June and Oct. 1953 fattening trials were carried out with 102 and 60 Leghorn

cockerels aged 70 and 100 days resp. In 1956 further trials were carried out with 74 Rhode Island Red cockerels aged 67-72 days. Food utilisation was efficient in the Leghorns only up to a body weight of 1200 g. *v.* that of 1500 g. in the R.I.R.s. Cockerels in runs utilised food more efficiently and yielded a better quality carcass than did those on free range; the latter were better in these respects than were cockerels in batteries which were darkened or in natural daylight. (Animal Breeding Abstracts)

POLIN, D., W. H. OTT, and O. H. SIEGMUND. (Merck Inst. Therapeutic Res., Rahway, N. J.)
THE INCIDENCE AND DEGREE OF YOLK MOTTLING IN EGGS FROM HENS FED DIETS WITH AND WITHOUT NICARBAZIN. *Poultry Sci. 36(3):* 524-528. Illus. 1957.—Yolk quality of eggs held in cold storage about 7 days was determined before, during and after the feeding of the coccidiostat, nicarbazin, at levels from 0.0001-0.007% to a White Plymouth Rock breeding flock. Yolks were scored in 0.5 units from 0.0 (normal) to 4.0 (extremely mottled). Before nicarbazin was fed 77.8 to 86.5% of the yolks scored 0.0-0.5. During 12 weeks of feeding nicarbazin at levels from 0.0005 to 0.001%, 90.3 to 95.5% of the yolks, the same incidence as controls, scored 0.0-0.5. For the next 12 weeks, nicarbazin at higher levels did not significantly increase the incidence and degree of mottling until 0.005% was fed. Mottling returned to control levels in 7-10 days after medicated feed was withdrawn. Yolk mottling, even in eggs from treated hens, varied markedly in incidence and degree. Results indicated that nicarbazin feeding was not the only cause of mottled yolks.—*D. Polin.* (Biological Abstracts)

POLIN, D. (Merck Inst. Therapeutic Res., Rahway, N. J.)
BIOCHEMICAL AND WEIGHT CHANGES OF MOTTLED YOLKS IN EGGS FROM HENS FED NICARBAZIN. *Poultry Sci. 36(4):* 831-835. 1957.—White Plymouth Rock (WPR) and White Leghorn (WL) hens fed the coccidiostat nicarbazin do not lay eggs with mottled yolks unless the dietary level of the drug exceeds 0.0125%. If the drug level is at least 0.005%, an increase in yolk mottling occurs in eggs while held in storage at 47°F for up to 14 days. Albumen is proportionately less and yolk proportionately greater in mottled yolks by 3.5%. Mottled yolks from WPR hens have higher water content, 56.9% vs 47.0% for control, lower lipid, 25.3 g% vs 29.5 g% for control, and lower total N, 21.2 mg/cc vs 24.3 mg/cc for control yolks. Comparative results are obtained in WL eggs. Mottling produced by nicarbazin is associated with a movement of water from albumen to yolk. A shift in absolute amount of protein does not occur, but some absolute and relative loss of yolk lipids to albumen does occur.—*D. Polin.* (Biological Abstracts)

REED, ALEX (U. Illinois, Urbana.), and **JOHN G. VELU.**
LIMITED VERSUS AD LIBITUM FEEDING OF WHITE LEGHORN PULLETS. *Indian. Jour. Vet. Sci. and Animal Husbandry 26(2):* 35-44. 1956.—Ad libitum feeding resulted in greater egg production to the extent of 3.6 eggs/2 month period, with standard error of 1.02 eggs. Ad libitum feeding showed a significant influence upon body weight. There was no correlation between initial body weight and 1st month's egg production nor between initial body weight and total egg production. There was no significant relation between egg size and system of feeding. (Biological Abstracts)

REED, ALEX (U. Illinois, Coll. Agric., Urbana), and **JOHN VELU.**
THE EFFECT OF AUREOMYCIN AND VITAMIN B_{12} ON THE GROWTH RATE OF CHICKS. *Indian Jour. Vet. Sci. and Animal Husbandry 26(3):* 135-138. 1956.—Vitamin B_{12} and Aureomycin gave a significant and consistent growth response when fed to chicks from 2-6 weeks of age. Both reduced the amount of feed per unit gain. Wide variation in growth rate between chicks was attributed to lack of uniformity in the inherited growth rate stimulus in these chicks. (Biological Abstracts)

ROBERTS, ROY E., and B. J. ROGERS. (Purdue U., Lafayette, Indiana.) THE EFFECT OF 2, 4, 5-T BRUSH SPRAY ON TURKEYS. *Poultry Sci. 36(4):* 703-705. 1957.—Alfalfa was sprayed, at the rate of 1.6 lb./acre, with 2,4,5-T brush spray containing 4 lb. of 2,4,5-T acid/gallon. There was no mortality and no appreciable effect on the rate of growth or amount of feed consumed when groups of 4-20 week-old Bronze males were given access to the sprayed alfalfa, or were fed on all-mash ration containing either 10% of dried sprayed alfalfa or 0.25% or 2,4,5-T.—*R. E. Roberts.* (Biological Abstracts)

ROMIJN, C., W. LOKHORST, and J. VELTHUIZEN. De invloed van vetten op de stikstofbalans van mestkuikens.
EFFECT OF FAT ON THE NITROGEN BALANCE OF FATTENING CHICKENS. *Tijdschr. Diergeneesk.*, 1957, *82*, 531-543. [Lab. Vet. Fysiol., Rijksuniv., Utrecht.] English, French and German summaries.—There were 18 North Holland Blues in 3 groups, 3 cocks and 3 hens in each. They were fed on milo 25, soya bean meal 20 and grain 15 per cent with either 40 per cent maizemeal or 34 per cent maizemeal and 5 per cent lard or 5 per cent "non-edible animal fat". Protein contents were 23.6, 22.3 and 22.4 per cent. Weight gain, average in 20 days for the groups in the same order, was 554, 471 and 490 g. and per kg. feed 336, 331 and 359 g.

N intake per head for 20 days was 62.2, 50.6 and 48.8 g. and percentage retained 57, 50 and 53; intake in g. and percentage retention of fat for 20 days were 48.00 and 86; 118.00 and 91; 120.40 and 88. From the energy balance it is calculated that much of the added fat was used as a source of energy and that the group with no added fat made more fat, 112 g., than either group with added fat, 106 and 60 g., with intakes for 20 days of 6241, 5680 and 5462 Cal. (Nutrition Abstracts and Reviews)

SCHOLTYSSEK, S. Untersuchungen über Fettanreicherung im Gelfügelmastfutter unter Zusatz von Antioxydantien. Erste Mitteilung: Tierisches und pflanzliches Fett sowie Acconox-Zusatz.
ADDITION OF FAT TO POULTRY FATTENING FEEDS WITH ADDITION OF ANTIOXIDANTS. 1. ANIMAL AND VEGETABLE FAT, AND ADDITION OF ACCONOX. *Arch. Geflügelk.*, 1957, *21*, 252-266. [Inst. Tierzucht., Landwirtsch. Hochsch., Stuttgart, Hohenheim.] English summary.—1. Four trials were made, each with 4 groups of 40 White Leghorn cockerels fattened from 4 to 10 weeks. After slaughter, physical and chemical properties and, after roasting, organoleptic properties of the meat were examined and vitamin A was estimated in bulked samples of liver.

In trial 1, experimental groups got supplements to the basal ration of Acconox 25 (Cyanamid-Gesellschaft, Munich), an anti-oxidant said to prevent loss of vitamins A and E from feeds without effect on flavour, 500 g. per metric ton, without or with vitamin B_{12} 10 μg., or penicillin, 5 mg., per kg. All supplements improved weight gain, and Acconox plus penicillin gave best feed efficiency and least cost, and highest vitamin A content of liver.

In trial 2, the basal feed was as before; all groups had the supplements of vitamin B_{12} and penicillin, and the experimental groups had 500, 750 and 1000 g. Acconox per metric ton. This time the control group did best and more than 500 g. Acconox, about the amount recommended by the U.S. manufacturers, was less profitable, though larger amounts did not impair the quality of the meat.

In trial 3 the basal feed had no animal fat; the experimental groups had 500 g. Acconox and 2 of them had the vegetable fats raised to 7.5 and 10 per cent each at the expense of cereals. Additional vegetable fat was ineffective and cost too much.

In trial 4 the basal feed had more cereals, and additional fat was supplied by 5 per cent beef tallow residues, with crude fat 38.7, crude protein 43.7 per cent, with vitamins and penicillin: the experimental groups had 500 g. Acconox and 2 of them had tallow residues raised

to 10 and 15 per cent, at the expense of cereals as before. The control group did best; Acconox had a depressing effect, counteracted only by the highest level of tallow residues, and the meat of this last group seemed slightly less desirable. (Nutrition Abstracts and Reviews)

SVENSSON, S. A.

SKELETAL RETENTION OF INJECTED RADIOPHOSPHATE IN CHICKS KEPT ON FEEDS OF DIFFERENT PHOSPHATE CONTENT.*Nature*, 1957, *179*, 972-973. [Inst. Animal Nutrit., Royal Agric. Coll., Upsala 7.]—Day-old chicks were given for 25 days a ration containing, per cent, Ca 1.04 and P 0.74. They were then injected intravenously with 27 μC. ^{32}P and the sexes were separated. Half the chicks were given a diet containing, per cent, Ca 1.57 and P 1.17. At 7 to 27 days after injection chicks were killed, metatarsal bones were dissolved in HCl and the radio-activity of the solutions was measured. At least 15,000 impulses were counted from each sample.. There was no significant difference in growth rate between the two groups of chicks. The activity remaining 7 to 20 days after the injection showed no definite trend. Bones of male and female chicks given the high-P diet and killed 24 to 27 days after the injection had only 70 to 80 per cent of the activity in corresponding chicks given the low-P diet.

In a second trial the diet of half the chicks after injection contained, per cent, Ca 0.91 and P 0.65, the diet of the other half Ca 1.6 and P 1.18. From 28 to 32 days after injection the average activity of the bones of chicks on the high-P diet was about 60 per cent of that in the other chicks. The differences were statistically significant. It appeared that retention of P, once it is deposited in the bones, is appreciably affected by the P content of the food. (Nutrition Abstracts and Reviews)

VAN REEN, R. and F. E. STOLZENBACH.

PYRIDINE DERIVATIVES AS GROWTH FACTORS IN THE DUCKLING. *J. Biol. Chem.*, 1957, *226*, 373-380. [McCollum-Pratt Inst., Johns Hopkins Univ., Baltimore, Md.]—Ducklings given a basal diet lacking nicotinic acid or its precursors grew slowly and showed signs of deficiency in a few days. Pyridyl-3-aldehyde added to the diet increased growth as much as nicotinamide, but pyridyl-3-carbinol and β-picoline were ineffective, even in 3 times the amount. When pyridyl-3-carbinol and β-picoline were given by mouth twice weekly they increased growth, but less than nicotinamide on an equimolar basis. Given intraperitoneally, all 3 compounds, and also diphosphopyridine nucleotide (DPN) and nicotinic acid, counteracted the deficiency. Nicotinamide was more effective in improving growth than nicotinc acid. From the growth responses obtained when 1 per cent sulphasuxidine was included in the basal diet, it appeared probable that the tissues of the bird and not the intestinal microflora convert the precursors to nicotinamide. On the deficient diet, DPN content of liver was low, but injection of nicotinic acid, nicotinamide, β-picoline or pyridyl-3-carbinol increased it. β-Picoline was fully as effective as nicotinic acid. Total liver DPN varied considerably with the dose and the compound injected, but the variation in concentration was much less, which indicated that although liver growth is depressed by the deficiency DPN is conserved. The possible mechanism of oxidation of the methyl group of β-picoline is discussed. (Nutrition Abstracts and Reviews)

VANSTONE, W. E., W. F. OLIVER, W. A. MAW, and R. H. COMMON.
(McGill U. Macdonald Coll. P. O., Quebec, Canada.)

OBSERVATIONS ON THE PHYSIOLOGICAL HALF-LIFE OF SERUM PROTEINS IN THE COCKEREL AND THE LAYING PULLETS. *Canadian Jour. of Biochem. and Physiol. 35(5):* 281-291. Illus. 1957.—The serum proteins of two cockerels and two pullets were labelled by oral administration of S^{35}-L-methionine. The subsequent decline of specific activity of serum proteins indicated physiological half-lives of approximately 6.5 days for both serum albumin and serum globu-

lin in the cockerels. One pullet continued in active lay and the half-life of its serum albumin was approximately 8.5 days; the decline of specific activity of the globulin fraction displayed a relatively steep initial phase; the succeeding decline gave a half-life of approximately 4.6 days; the half-life of the serum phosphoprotein fraction was probably considerably less. These results are discussed in terms of estimated replacement rates of the proteins. The second pullet stopped laying and the results with this bird are discussed separately. The average specific activity of yolk protein attained a maximum in the egg laid on the 6th day after labelling. The subsequent decline in average specific activitity of yolk protein with time followed a logarithmic course.—Auth. abst. (Biological Abstracts)

van TIENHOVEN, A., R. D. CRAWFORD, and **S. A. DUCHAINE.** (Cornell U. Agric. Expt. Sta., Ithaca, N. Y.)
THE EFFECT OF NICARBAZIN ON SPERMATOGENESIS AND SEMEN QUALITY. *Poultry Sci. 36(4):* 760-762. 1957.—A level of 0.0125% nicarbazin (4,4′-dinitrocarbanilide-2-hydroxy-4,6-dimethylpyrimidine) in the feed, which severely depresses egg production of the domestic fowl, was fed to individual males. Semen was collected and the fertilizing capacity assayed by inseminating 5 hens, housed in individual laying cages, with semen of each rooster. In vitro semen quality assays included determination of sperm concentration, methylene blue reduction time, incidence of dead and of abnormal spermatozoa. Nicarbazin feeding had no effect on fertilizing capacity, hatchability, semen quality, body weight, testes and thyroid weight, nor did it affect the histology of the latter 2 organs.—Auth. summ. (Biological Abstracts)

VINCEK, C. Značenje suncokretove sačme u ishrani stoke.
IMPORTANCE OF SUNFLOWER CAKE IN STOCK FEEDING. *Stocarstvo,* 1956, *10,* 52-61. [Zavod Stočarstvo NRH, Novi Dvor.] English and German summaries.—In experiments with group of 30 day-old chickens, fed for 60 days, a standard mixture containing 10 per cent each of soya bean and sunflower cakes as chief sources of plant protein or modifications of this, increasing or decreasing the amount of sunflower cake, replacing it partly or completely by soya bean cake, or partly by fishmeal, was given. The changes reduced total chicken weight, increased feed consumption and cost of weight gains.

Analysis of the protein of the standard mixture showed that sunflower cake had a methionine content similar to that of egg protein, and complemented the protein of soya bean, in which methionine is a limiting factor.

The amount of fishmeal which is as effective as 10 per cent sunflower cake is so great as to render its use uneconomical. Wider cultivation of sunflowers in Croatia is recommended. (Nutrition Abstracts and Reviews)

VOHRA, PRAN, and **F. H. KRATZER.** (U. California, Davis.)
THE ESSENTIAL NATURE OF LYSINE IN THE PREVENTION OF FEATHER DEPIGMENTATION OF TURKEY POULTS. *Arch. Biochem. and Biophys. 68(1):* 76-80. 1957.—Turkey poults fed a ration deficient in lysine grow slowly and fail to form black pigment. L-Proline, L-ornithine, DL-homocitralline, DL-pipecolic acid, DL-α-aminohexanoic acid, and ε-aminocaproic acid were ineffective in promoting growth or preventing feather depigmentation of turkey poults deficient in lysine. ε-N-Acetyl-DL-lysine was utilized approximately 30% as effeciently as DL-lysine in promoting growth of poults. Feather pigmentation was improved somewhat by a high level of the compound.—Authors. (Biological Abstracts)

WEST, JOHN W., (Agric. and Mechanical Coll. Oklahoma, Stillwater.), and **JAMES E. HILL.**
EFFECTS OF CERTAIN ANTIBIOTICS ON PROTEIN UTILIZATION BY BROILERS. *Poultry Sci. 36(4):* 691-697. 1957.—Four trials, involving 48 experimental pens and more than 7000 broiler-type

chickens, were conducted for the purpose of determining the effects of certain antibiotics fed at "low" and "high" levels on protein utilization by broilers. Isocarloric rations were formulated which contained protein levels of 16, 18, 20 and 22%. Procaine penicillin was added in the form of a supplement (20% purity) to provide 0, 2 and 20 g of procaine penicillin G/ton of feed for each protein level. Aureomycin and terramycin were added in the form of feed supplements (10 g of antibiotic/lb.) to provide 0, 10 and 100 g of the pure antibiotic/ton of feed for each protein level. Optimal growth was reached with the 20% level of protein in the presence of an antibiotic at either the "low" or the "high" level. When the diet contained no antibiotic, 22% of protein was required for optimal growth. Total (gross) feed efficiency followed a somewhat similar pattern. The maximum effects of the antibiotics upon growth and protein efficiency, whether fed at "low" or "high" level, were produced at the 16% level of protein. Little or no increase in growth and protein efficiency due to an antibiotic, at either level, was obtained with rations containing 20 to 22% of protein. Mortality and variability bore no consistent relationship to the level of either dietary protein or dietary antibiotic.—Auth. summ. (Biological Abstracts)

WOHLBIER, W. and **M. KIRCHGESSNER.** Untersuchungen über die Einsparung tierischen Eiweisses in der Kükenaufzucht durch Zugabe von Vitamin B_{12}.

SPARING OF ANIMAL PROTEIN IN CHICKEN REARING BY A SUPPLEMENT OF VITAMIN B_{12}. *Arch. Geflügelk.*, 1957, *21*, 73-85. [Inst. Tierernährungslehre, Stuttgart. Hohenheim.] English summary.—When soya bean meal replaced 30 or 50 per cent of the animal protein in a chick ration and supplements of vitamin B_{12} were given, liveweight gains and efficiency of feed conversion were similar to those with a diet containing protein solely from animal sources. In another experiment the animal protein content of the ration was still further reduced without appreciably affecting growth or feed utilisation, a result which was attributed to the relatively high vitamin B_{12} content of the ration. Nevertheless, a supplement of vitamin B_{12} significantly improved growth, and it is concluded that such a supplement is desirable in practical rations, since the amount in animal proteins varies widely. In samples of fishmeal tested microbiologically vitamin B_{12} content ranged from 10 to 95 μg. per kg. (Nutrition Abstracts and Reviews)

WOOLAM, D. H. M., and **J. W. MILLEN.** (U. Cambridge, Eng.)

THE RELATIONSHIP BETWEEN HYPOVITAMINOSIS A AND THE CEREBROSPINAL FLUID PRESSURE IN THE CHICK: AN EXPERIMENTAL STUDY. *Brit. Jour. Nutrition 10(4):* 355-363. 1956. —Cerebrospinal fluid pressure measured in 50 presumably normal chicks showed no significant variation over the range from 50-150 days of age. The average pressure measured was 102 mm of water. A rise of some 1.03 mm/day occurred in cerebrospinal fluid pressures of chicks fed a diet containing only 1.6 ppm carotene, but hatched from eggs laid by mothers on a normal diet. Similar pressure increases occurred when the diet of the mother was deficient in carotene and it was found that cerebrospinal fluid pressure levels could be related to the number of days the hen and/or chick received a deficient diet. Absence of signs of neurological disturbance or of bony abnormalities at post mortem indicated an effect of vitamin A deficiency upon production of cerebrospinal fluid. (Biological Abstracts)

PATHOLOGY

BURMESTER, B. R. (U. S. Dept. Agric., East Lansing, Michigan.)

TRANSMISSION OF TUMOR-INDUCING AVIAN VIRUSES UNDER NATURAL CONDITIONS. *Texas Repts. Biol. and Med. 15(3):* 540-558. 1957.—Neoplastic diseases among animals occur most

frequently in the domestic chicken. This is due to the high incidence of lymphomatosis which occurs naturally in flocks of chickens. Visceral lymphomatosis (lymphoid leukosis) which is responsible for 0.5 to 2/3 of all losses from neoplasms, is caused by a filtrable virus, and is the only one of several infectious neoplasmas of the chicken which appears to be contagious. The usual flock shows a high incidence of infection with visceral lymphomatosis, but a comparatively low rate of morbidity and mortality. Most infections remain in a latent state resulting in many chickens that shed virus into their eggs and also in their saliva and feces. Chickens with a latent infection have circulating antibodies which are deposited in their eggs and serve to give some protection to their progeny. Chicks that are hatched from infected eggs shed virus in their saliva and feces, thereby contaminating the hatching unit of the incubator and the brooder unit. This provides an excellent source of infection for other more susceptible chicks of hens without antibodies, resulting in a high rate of infection and neoplasia. It has been demonstrated that a high incidence of visceral lymphomatosis may develop when the virus is placed in the trachea, on the conjunctiva, or in the oral or nasal cavities. Preliminary data indicate that certain types of water fountains play an important role in the mechanism of transmission of visceral lymphomatosis in the brooder unit.—*B. R. Burmester.* (Biological Abstracts)

WAIBEL, P. E., ELTON L. JOHNSON, B. S. POMEROY, and **L. B. HOWARD.** (U. Minnesota, St. Paul.)

TOXICITY OF TETRAMETHYLTHIURAM DISULFIDE FOR CHICKS, POULTS, AND GOSLINGS. *Poultry Sci. 36(4):* 697-703. Illus. 1957.—Chicks and goslings were very sentitive to poisoning by the dietary inclusion of tetramethylthiuram disulfide (TMTD), the former species showing toxicity at approximately 40 ppm and the latter species showing toxicity at perhaps slightly higher than this amount but definitely under 150 ppm. Turkey poults, however, appeared to be more resistant to the toxicity and could apparently tolerate about 200 ppm of the nocuous component. The symptoms as shown in all 3 spp. involved leg deformities and loss of weight. The chicks showed a distinctive type of leg weakness, which involved sitting on the hocks, crooked and curled toes, enlarged hocks, and some slipped tendons and some spraddles. Since seed corn treated with Arasan contains about 630 ppm of TMTD it is hazardous to feed such corn to poultry even as a small percentage of the ration.—Auth. summ. (Biological Abstracts)

WRIGHT, G. W., and **J. F. FRANK.** (Animal Pathol., Canada Dept. Agric., Sackville, N.B.)

OCULAR LESIONS IN CHICKENS CAUSED BY AMMONIA FUMES. *Canadian Jour. Comp. Med. and Vet. Sci. 21(7):* 225-227. 1957.—Investigations of a keratoconjunctivitis of chickens failed to reveal any causative microorganism. However, exposure of chicks for 15 days or more to an atmosphere with a high content of ammonia fumes reproduced the condition seen in the field.—*A. Greig.* (Biological Abstracts)

POULTRY PRODUCTS AND MARKETING

APARACIO MACARRO, J. B. 1957. [Fac. Vet., Cordoba.] Determinacion del rendimiento a la canal en pollos explotados en bacteria.

CARCASS YIELD IN BATTERY-REARED CHICKS. *Arch. Zootec.* [*Cordoba*], *6:* 151-159.—Twenty-four White Leghorn, 10 Tawny Prat, 12 Golden Andalusian and 9 *cortijera* [Spanish farmyard] chicks were killed after being reared in batteries for 11½ wks. Average dressing percentages were 56.8, 54.4, 58.9 and 60.2% resp. for the 4 breeds. (Animal Breeding Abstracts)

BAKER, ROBERT C. (Cornell U., Ithaca, N. Y.)
DETERMINING THE KEEPING QUALITY OF ICE-PACKED AND DRY-PACKED POULTRY. *Poultry Sci. 36(4):* 859-864. 1957.—This study showed that there was very little difference in bacteria counts between the dry-packed and ice-packed broiler halves. There was little difference in appearance of the raw carcasses in the 2 groups. The taste panel members preferred the dry-packed cooked broiler halves over the ice-packed in general surface appearance of the cooked product, aroma, flavor and juiciness of the flesh.—*Robert C. Baker.* (Biological Abstracts)

BAKER, R. C., and R. CURTISS. (Cornell U. Ithaca, N. Y.)
INDIVIDUAL HEN DIFFERENCES IN EGG SHELL MOTTLING AND THE RELATIONSHIP OF SHELL MOTTLING TO CLUTCH SIZE, INTERNAL QUALITY AND WEIGHT LOSS. *Poultry Sci. 36(4):* 904-908. Illus. 1957.—When an egg is first laid, there isn't any shell mottling. In as short a period as one-half hour, shell mottling may appear. This mottling shows up as light-colored, translucent spots of various sizes in the shell when a candle is used. The study showed that there was a large difference among individual hens in the degree of mottling of the shells. There was no relationship between size of clutch and amount of shell mottling. There wasn't any significant correlation between total weight loss and shell mottling. Mottling of the shell does not appear to influence internal quality.—Auth. summ. (Biological Abstracts)

BLATTNA, J., J. FRAGNER, and J. KRUMPHANZLOVA, 1957. (Inst. Food Tech., Prague.) Vitaminy v čerstvych vejcich.
THE VITAMINS IN FRESH EGGS. *Sborn. csl. Akad. Zemed. Ved. Zivoc. Vyr., 2(30):* 467-478. [Russian and English summaries.]—The vitamin content of eggs of the Rhode Island Red, Brown Leghorn and White Leghorn breeds was not affected by breed but was influenced by season. Individual variation was considerable. (Animal Breeding Abstracts)

BYLUND, H. B., and R. L. BAKER.
CONSUMER SURVEY VERSUS STORE DATA FOR DETERMINING EGG CONSUMPTION. *J. Farm. Econ.*, 1957. *39*, 770-777. [Pennsylvania State Univ.]—The effect on egg consumption of a month-long educational campaign for better breakfasts in a city of 10,000 inhabitants was assessed from a study in 187 households and a survey of egg sales by retail stores in the city before and after the campaign. Use of eggs increased by 36 per cent according to the family survey and decreased by 12 per cent according to retail store sales records. Further investigation indicated that the discrepancy arose from consumers changing their sources of supply and obtaining many eggs otherwise than from retail stores. (Nutrition Abstracts and Reviews)

CARLSON, C. W., W. KOHLMEYER, E. B. ALSUP, L. M. BURRILL, and O. E. OLSON.
CHEMICAL COMPOSITION OF TURKEYS AS IT AFFECTS PALATABILITY AND KEEPING QUALITY. *S. Dakota Agric. Exp. Stat. Bull.* No. 463, April 1957, pp. 11.—In experiments in 2 successive years turkeys were fed on high- and low-energy diets containing maize and oats, respectively. The high-energy diet was more efficient, on the average 2 and 1.2 lb. less feed consumed per lb. weight gained; it also produced fatter turkeys, although this was not obvious. There was no difference in flavour, tenderness or juiciness before or after storage at 0°F. for 6 months. Quality of hens, but not of toms, was lower after storage. (Nutrition Abstracts and Reviews)

LENTZ, C. P., and L. Van Den BERG. (Div. Appl. Biol., Natl. Res. Council, Ottawa, Canada.)
LIQUID IMMERSION FREEZING OF POULTRY. *Food Technol. 11(4):* 247-250. 1957.—Optimum appearance of immersion frozen poultry was produced by freezing in a moderately agitated methyl alcohol bath

at -20°F or lower. Immersion times of 20 minutes for 4-6 lb. chickens and 40 minutes for 15 lb. turkeys were required to ensure retention of satisfactory appearance in birds finished in an air blast freezer. Initial temperature of the birds had a marked effect on freezing time and appearance after freezing but "Cry-O-Vac" packaging did not. Optimum appearance was retained in storage at +20°F for 2 weeks, at 0°F for 6 weeks (after which a slight change was noticeable) and at -20°F indefinitely. Air blast freezing at -100°F produced an appearance similar to immersion freezing at -20°F but air blast freezing at -40°F was appreciably different.—*C. P. Lentz.* (Biological Abstracts)

MOUNTNEY, G. J. and **J. H. QUISENBERRY.** (Texas Agric. Expt. Sta., College Station.)
CONTAMINATION OF BROILERS WITH CHLORDANE AND PYRETHRUM. *Poultry Sci. 36(4):* 923-924. 1957.—Group of two birds were forced to inhale a chlordane-pyrethrum fog. The birds were then killed and dressed at 0, 2 or 24 hours after fogging, held frozen for several days, cooked and presented to a 12 member taste panel. The number of panel members who detected off-flavors in the white meat increased from 1 for the control group to 5 for the group slaughtered 24 hours after fogging. The detection of off-flavors in dark meat by the taste panel followed a similar pattern. Apparently, contamination took place through inhalation of the chlordane-pyrethrum mist which was absorbed and distributed throughout the body tissues.—Auth. summ. (Biological Abstracts)

MOUNTNEY, G. J., and **C. VANDERZANT.** (Texas Agric. Exptl. Sta., College Station.)
RELATIONSHIP OF SELECTED EGG QUALITY MEASUREMENTS. *Poultry Sci. 36(4):* 908-913. 1957.—A study of the relationships between specific gravity and interior quality, specific gravity and porosity (dye stain), specific gravity and shell thickness, specific gravity and shell weight, interior quality and porosity (dye stain) of both fresh eggs and those incubated 2 weeks, interior quality and shell thickness, interior quality and shell weight, and shell thickness and porosity was made. Comparisons were also made of the various egg quality characteristics among Inbred Hybrid No. 1, Inbred Hybrid No. 2, and Leghorn hens. Only correlation coefficients for the relation between specific gravity and shell thickness, and specific gravity and shell weight were statistically significant. Analysis of variance disclosed statistically significant differences between breeds for interior quality of both fresh eggs and those aged 2 weeks, and for porosity as measured by dye staining. Eggs from the Inbred Hybrid No. 1 strain had the least porous shells and the highest interior quality.—Auth. summary. (Biological Abstracts)

RHODES, MARVIN B., and **ROBERT E. FEENEY.** (U. Nebraska, Lincoln.)
MECHANISMS OF SHELL DETERIORATION: COMPARISONS OF CHICKEN AND DUCK EGGS. *Poultry Sci. 36(4):* 891-897. 1957.—Comparative studies were made of the storage stabilities (thinning or weakening of thick egg white and yolk membrane at 37 or 43°C) and the chemical and biochemical properties of chicken and duck eggs. Duck eggs were at least 8 times more resistant to storage deterioration than chicken eggs. Duck eggs also were not "thinned" by storage in ammonia gas as were chicken eggs. Duck egg white did not give extensive precipation when diluted with water as did the chicken egg white, but when chicken-egg-white lysozyme was added to duck egg white, precipitation occurred upon dilution with water. Duck eggs, however, showed the same deteriorative thinnings as chicken eggs when exposed to gaseous reducing chemicals (thioglycol.)—*M. B. Rhodes.* (Biological Abstracts)

ROMIC, S. klaoničkoj vrijednosti domace pure.
THE CARCASE YIELD OF DOMESTIC TURKEYS. *Veterinaria, Sarajevo,* 1957, *6,* 354-359. [Poljoprivredno-Sumarski Fak., Zagreb.] English summary.—The turkeys were 25 of each sex 7 months old and

the same number a year old. They were fasted for 12 hr. before slaughter.

Mean liveweights of young males and females and older males and females, in that order, were 5.94, 3.86, 8.69 and 4.29 kg. Yields of meat with bones were 3.94, 2.35, 6.15 and 2.59 kg. Cleaned carcases, including, besides meat and bones, head, neck, wings and feet, made up 79.5, 72.0, 80.3, and 71.3 per cent of liveweight and usable residue, heart, lungs, liver, gizzard and fat, another 7.7, 9.0, 7.7 and 10.7 per cent. Males were thus more profitable than females and older than younger birds. (Nutrition Abstracts and Reviews)

SCHOLTYSSEK, S. Tagesfragen der Junggeflügelmast.
PRESENT-DAY PROBLEMS OF FATTENING GROWING POULTRY. *Deutsch. Wirtschaftsgeflügelzucht*, 1957, *9*, 538-540. [Stuttgart, Hohenheim.]—Average yearly consumption of poultry meat per person in Germany is 2 kg. compared with 16 kg. in the United States. Of birds sold, 50 per cent are boiling fowls, 20 ducks, 20 geese and turkeys and only 10 per cent roasters. In order to increase public demand for young fat birds, more attention must be paid to selection for breeding, rearing, feeding and marketing. Crossing of Leghorn hens with New Hampshire, White Plymouth Rock, Sussex and Blausperber cocks is recommended for meat quality. For the first 4 weeks of life fattening birds must be given a rearing ration: this is then replaced by a fattening ration, which should remain basically as prescribed by the Society of German Poultry Breeders (VDW), but a minimum digestibility quotient of 90 per cent with higher energy values, a closer nutritive ratio and a high protein content are desirable. A ration providing 3 kg. feed per kg. weight gain is considered optimum; pelleted all-mash rations are recommended.

Maintenance, slaughter and marketing are briefly discussed. (Nutrition Abstracts and Reviews)

WINTER, A. R., and P. CLEMENTS.
COOKED EDIBLE MEAT IN READY-TO-COOK POULTRY. *J. Amer. Dietetic. Assoc.*, 1957. *33*, 800-802. [Ohio Agric. Exp. Stat., Columbus.]—The distribution, per cent, of the carcase cuts of broilers, small and large turkeys, ducks and geese, ready for cooking, is tabulated. Percentage was greatest for the breast of large turkeys, ducks and geese, but for the legs and thighs of broilers and small turkeys. The percentage of edible meat in the carcase cuts is also tabulated. Cooking loss, per cent, was for small turkeys 24, broilers 24.5, large turkeys 32.3, geese 35.4 and ducks 44.5. This included 1.6, 1.0, 5.6, 6.2 and 21.4 per cent fat loss, respectively. The number of pounds of carcase needed to give 1 lb. cooked edible meat was for large turkeys 1.76, small turkeys 1.85, broilers 1.94, geese 2.42 and ducks 2.6. Corresponding figures for breast alone were 1.5, 1.5, 1.6, 2.1 and 2.3, and for legs and thighs 1.8, 1.7, 1.9, 2.1 and 2.3 (Nutrition Abstracts and Reviews)

YACOWITZ, H., F. PANSY, S. WIND, H. STANDER, H. L. SASSAMAN, J. F. PAGANO, and W. H. TREJO. (Squibb Inst. Med. Res., New Brunswick, N. J.)
USE OF NYSTATIN (MYCOSTATIN) TO RETARD YEAST GROWTH ON CHLORTETRACYCLINE-TREATED CHICKEN MEAT. *Poultry Sci. 36(4):* 843-849. Illus. 1957.—Increased yeast growth and yeasty odor were observed in chlortetracycline-treated chicken parts during refrigerated storage. The yeasty odors were objectionable when the chicken parts were submitted to odor tests. Mycostatin, an antifungal antibiotic, used at levels of 5 and 10 ppm along with chlortetracycline at 10 ppm effectively prevented the growth of yeasts and molds and the development of fungal odors on stored chicken wings and drumsticks. Mycostatin does not penetrate chicken skin or muscle and is rapidly inactivated by boiling. Competition exists between bacteria and fungi on the surface of stored chicken meat. The marked suppression of bacteria by use of an antibacterial antibiotic results in increased growth of fungi. The fungi are readily suppressed by Mycostatin.—*H. Yacowitz.* (Biological Abstracts)

MANAGEMENT

LLOYD, D. H.
EFFICIENCY STANDARDS AND THE ECONOMICS OF LAYING FLOCKS. *Agric. Rev.*, 1957, *3*, No. 2, 15-24. [Dept. Agric., Univ. Reading.].—Average production standards and requirements of feed, with the proportions homegrown and purchased, and labour, and mortality and proportions culled, in 4-week periods for 2 years of flocks kept under 5 systems are tabulated. A balance sheet by 4-week periods, which can be adapted for individual use, is shown. Taken in isolation most systems showed a loss on the prices and charges adopted for the calculations. It is, however, shown that as part of a complete farming enterprise a poultry unit can be a financial asset, utilising surplus labour and produce and otherwise unused accommodation, and in control of pastures and supply of manure. Advice for successful poultry rearing includes section of good high-yielding strains, rearing or buying replacements as young as possible instead of purchasing at point of lay, careful rather than excessive culling, and paying great attention to all management practices. (Nutrition Abstracts and Reviews)

MAUCH, A., A. PADURARU, D. PETCU, E. HARSIAN, M. STEFANESCU, and P. BALEA. 1956. Productivitatea ratelor Peking in conditii climatice diferite.
THE PRODUCTION OF PEKIN DUCKS IN DIFFERENT CLIMATES. *Anal. Inst. Cerc. zooteh., 14:* 457-467. [Russian, French and German summaries.]—The production of 550 Pekin ducks at 600-700 m. above sea level averaged 75.1 eggs per year *v.* 71.2 for 730 Pekin ducks in the plains of S.E. Romania. In summer production was higher in the mountains, averaging 19.0 eggs in July-Aug. *v.* 3.5 in the plains. There was no appreciable difference in the summer decrease in body weight in the 2 regions. (Animal Breeding Abstracts)

MAXWELL, B. F. and J. B. LYLE. (Poultry Producers Central California, Petaluma.)
RESTRICTED WATER FOR WET DROPPING PREVENTION. *Poultry Sci. 36(4):* 921-922. 1957.—The limiting of individually caged hens to water 3 times/day for 15 minutes each time prevented wet droppings and did not reduce egg production. Auth. summ. (Biological Abstracts)

NAKAJO, S. 1957. (Fac. Agric., Nagoya Univ.)
STUDIES ON BROODINESS OF THE DOMESTIC FOWL. III. EFFECT OF LIGHTING AT NIGHT ON BROODINESS. *Jap. J. zootech. Sci., 27:* 313-316. [Japanese with English summary.]—Broody hens of the Nagoya breed were subjected to additional lighting by electric lamps. The effect of this treatment on broodiness and on the non-productive period after the cessation of broodiness was investigated. Light treatment was given for 20 hrs. (noon to 8 a.m.) in experiment A, for 13 hrs. (5 p.m. to 6 a.m.) in B, and for 7 hrs. (5 p.m. to midnight) in C.

Broodiness was interrupted after an average of 2.68 days in experiment A, 3.27 days in B, and 4.45 days in C. The non-productive period after the cessation of broodiness averaged 9.94, 7.75 and 5.10 days in A, B and C resp. The difference in days between experiments A and B was not significant at the 5% level. There was no relationship between the duration of broodiness before and during treatment, or between the length of the non-productive period and the duration of broodiness *in toto* or during treatment.—From English summary. (Animal Breeding Abstracts)

GENERAL

BARKER, J. S. F. and **H. W. BURTON.**
REPORT OF THE QUEENSLAND RANDOM SAMPLE POULTRY PRODUCTION TRIAL, 1954-1955. *Queensland Agric. Jour. 82(8):* 456-466. Illus. 1956.—At this, the first random sample trial in Queensland, from 25 producer applications received, 8 samples of eggs were selected by ballot to fill 8 available pens. Each sending of 150 eggs was reduced to 144, hatched and the pen finally reduced to 30 pullets. Feeds were changed at 8 weeks and at 18. The test was carried a total of 66 weeks. Scoring of pens was based on hatchability (5 points for each 1% of set eggs that hatched), rearability (4 points for each chick to 10 weeks and 6 points for each 10 week chick that lived to 18 weeks), egg production (1 point for each 2 oz. of eggs, soft-shelled eggs excluded), and fourth, livability (30 survivors to 66 weeks, 1000 points; 29, 950; and down to 20 survivors, 50 points). The trial included 4 groups of White Leghorns and 4 of Australorp breed. Highest score, 8,530, was made by an Australorp pen, second highest by a White Leghorn. The Australorps averaged 8.063, the White Leghorns 7.114. The Leghorns excelled in rearability but the Australorps were ahead in the other 3 factors. Egg laying records began in midsummer, Jan. 24, 1955: Egg production rose rapidly for the first 9 weeks and reached a peak at 33 weeks (to about 320 oz./week for a pen of Australorps and about 310 oz. for the Leghorns). Records of mortality showed deaths were concentrated in the first 3 weeks from hatching, during the early egg production period and toward the end of the first laying year.—*T. L. Bissell.* (Biological Abstracts)

CHURCH, LLOYD E. (George Washington U. Washington, D.C.)
COMBUTHAL AS AN ANESTHETIC FOR BABY CHICKS. *Poultry Sci. 36(4):* 788-791. 1957.—Effects of a new anesthetic, Combuthal, were studied on chicks from 1 to 7 days of age. The drug was given intraperitoneally below the free border of the sternum, using a 1 cc tuberculin syringe. The optimum dose for a 1-day-old chick was 0.05 cc and, in general, it was necessary to increase the dose by 0.01 cc. for each additional day of age. Seven separate tests were made by injecting a group of chicks each day with the optimum dose for age. Combuthal produces smooth and rapid induction. The time required to reach a state of surgical anesthesia varies from 1 to 5 minutes, while recovery occurs in from 4 to 6 hours. Combuthal is easily administered by the intraperitoneal route. Profound anesthesia is obtained and its duration is prolonged. Muscular relaxation is thorough, facilitating manipulation during surgical procedures. Recovery is quiet and total.—*Lloyd E. Church.* (Biological Abstracts)

KINNEY, TERRY B. and **THOMAS W. FOX.** (U. Massachusetts, Amherst.)
CONSIDERATIONS CONCERNING THE APPLICATION OF STATISTICS TO RANDOM SAMPLE BROILER TESTS. *Poultry Sci. 36(4):* 877-880. 1957.—An analysis of the Mass. Random Sample Broiler Test demonstrated that the 10-week body weight data exhibits heterogeneity of variances. This heterogeneity existed among entries within sex and also in the combined sex data. The problem of heterogeneity is discussed as related to the application of tests of significance to broiler test results. A correlation between the body weight means and standard deviations was also found and is related to the problem of heterogeneity. —*T. W. Fox.* (Biological Abstracts)

NAZARENKO, I. I. 1957. Konkurs jaîcenoskosti v Japonii.
EGG LAYING TEST IN JAPAN. *Pticevodstvo, 7(6):* 45.—In the test, lasting from 1st Nov. 1954 to 30th Oct. 1955, the best results were obtained with an average of 325 eggs at an av. weight of 50.9 g. for New Hampshires, 317 eggs at 54.6 g. for Mikawas, 313 eggs at 53.6 g. for Naked fowls, 310.6 eggs at 54.7 g. for White Leghorns, and 305 eggs at 54.7 g. for Rhode Island Reds. (Animal Breeding Abstracts)

NEWBERNE, P. M., O. A. LAERDAL, and B. L. O'DELL (U. Missouri, Columbia.)

A SURGICAL METHOD FOR THE SEPARATION OF URINE AND FECES IN YOUNG CHICKENS. *Poultry Sci. 36(4):* 821-824. Illus. 1957.—Description of a method involving simple surgical techniques which can be utilized to separate urine and feces in young growing chickens. An exterioration of the ureters is effected which allows quantitative collection of urine and feces separately for periods up to 2 weeks during the period of rapid growth in the chick.—Auth. summ. (Biological Abstracts)

SYSOEV, A. A. 1957. Na pticefermah Koreiskoi Narodno-Demokratičeskoi respubliki.

AT POULTRY FARMS OF THE KOREAN PEOPLE'S DEMOCRATIC REPUBLIC. *Pticevodstvo, 7(5):* 31-33.—The indigenous fowl in Korea has yellow, brown or sometimes black plumage; the ♀♀ have an erect leaf comb, and red wattles. They have good meat characters: the body weight of ♂♂ averages 3.5 kg. and that of ♀♀ 2.5-3.5 kg. Production averages 110 eggs per year, each weighing 55-60 g. Leghorns were imported in the post-war period and, although they are not so resistant to disease, are with the indigenous breed the most widely bred.

The East Korea duck is brown and the feathers are sometimes edged with white. Average body weight is 3.0-3.5 kg. in ♂♂ and 2.5-3.0 kg. in ♀♀. Production averages 80-100 eggs per year. Pekin ducks have been introduced from China since the war; they are less thrifty than the indigenous ducks. (Animal Breeding Abstracts)

ZNOJILOVA, V., V. ZOUFALY, and V. PATKOVA. 1957. Metody vazeni vajec pri kontrole uzitkovosti slepic.

METHODS OF WEIGHING IN RECORDING EGG PRODUCTION. *Sborn. csl. Akad. Zemed. Ved, Zivoc. Vyr., 2(30):* 275-284. [Russian, English and German summaries.]—In the 1954-55 laying year the production of 320 hens of the White Leghorn, Brown Leghorn, Rhode Island Red and White Wyandotte breeds was recorded. Production totalled 59,427 eggs averaging 57.85 g. Coefficients of correlation between egg weight based on daily weighings and based on monthly averages increased from +0.59 for Oct. to +0.95 for April and then decreased to +0.88 for Aug. It is recommended that at testing stations eggs should be weighed only on a specified day each week during the laying period or daily on the 16th to 20th of each month with variations for pedigree flocks.—(Animal Breeding Abstracts)

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Note Saving

Feeding Program	Growing Period	Weight	Feed Efficiency	Cost per lb. of Meat
All Mash—No Grit	9 wks	3.36	2.63	17.02
All Mash—With Fine (Chick) Size STONEMO	9 wks	3.42	2.59	16.75
All Mash—Recommended STONEMO Feeding Program	**9 wks**	**3.44**	**2.55**	**16.53**

Coarse Size Stonemo Granite Grit Magnified 3 Times.

Considering all costs (chicks, feed, grit, and incidentals) a saving was made of almost ½¢ per lb. or $16.85 per thousand broilers. Chick cost was 13 cents. Average feed cost was $5 per hundred, and the Grit was figured at local retail cost of 1¢ per lb.

STONE MOUNTAIN GRIT COMPANY, INC., Lithonia, Georgia

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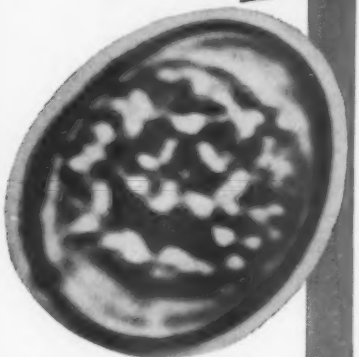

THE VALUE of a coccidiostat is measured by these criteria: feed conversion ratios; shank and feather pigmentation; absence of clinical symptoms or coccidiosis mortality (under a wide range of exposure levels); and a high degree of resistance to reinfection. GLYCAMIDE has *demonstrated all* of these attributes as an anticoccidial agent for broilers and for replacement chicks raised for laying or breeding flocks!

Potent GLYCAMIDE is the new anticoccidial agent from Merck, for the prevention of cecal and intestinal coccidiosis in growing chickens. When incorporated in the feed at a level ranging from 0.002 to 0.003%, this compound is highly

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For further information on AUROFAC Feed Supplement and AUREOMYCIN, write to AMERICAN CYANAMID COMPANY, AGRICULTURAL DIVISION, NEW YORK 20, N. Y.

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Simply write the Granite Grit Institute at the address below and tell us how, where, and when you plan to use the film, and we shall endeavor to schedule it to meet your convenience.

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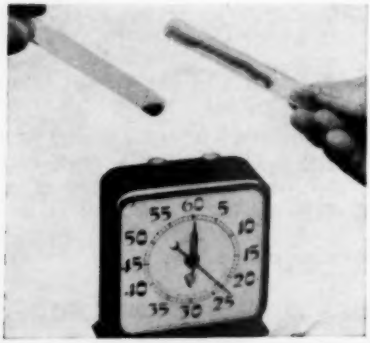
For maximum feed efficiency and performance, vitamin K plays an important supporting role in poultry rations. Research has proved that this anti-hemorrhagic vitamin greatly improves a bird's resistance to disease (1)—provided it is supplied in adequate amounts and in a readily absorbable form! This is particularly important during times of disease or stress as in coccidiosis (2), dubbing, debeaking, or when enteritis complicates absorption problems.

Many changes in poultry rations and feeding practices (3) have combined to limit the amount of natural vitamin K in the high-energy rations of today. To further complicate the problem, adequate levels of fat-soluble forms are often difficult to maintain in feeds. Unfortunately there is no rapid chemical or biological method sensitive enough to measure vitamin K at the low levels used in feeds (4).

To eliminate this uncertainty, many nutritionists and feed manufacturers are now depending on the water-soluble form of vitamin K—KLOTOGEN F(R)—(Stabilized Menadione Sodium Bisulfite).



Prothrimbin and clotting tests prove the superior effectiveness of KLOTOGEN F in poultry feeds. Blood sample in the right test tube was from a chicken fed rations containing KLOTOGEN F as vitamin K source. It clotted in 23.5 seconds while blood in the left tube from the bird fed rations containing inadequate vitamin K was still fluid.

KLOTOGEN F, the modern vitamin K analog, does a superior job of protecting flocks against vitamin K deficiencies. Early laboratory tests proved KLOTOGEN F at least four times as effective as fat-soluble forms in the presence of excess sulfa (5). Later experiments showed KLOTOGEN F to be up to 10 times as effective as menadione in the presence of 0.1% sulfa in the diet, or three times as effective in the absence of sulfa medication (6). Work at West Virginia (7) showed a 6-time ratio of activity for KLOTOGEN F over menadione, i.e., 18 times as effective on a menadione equivalent basis, again even in the absence of sulfa.

Nutritionists like KLOTOGEN F because they know exactly how much vitamin K is going into each batch of feed . . . exactly how much is available to the flocks that consume it . . . and that it gives maximum effectiveness at lowest possible cost. Every lot of KLOTOGEN F is quantitatively assayed before it leaves Abbott Laboratories.

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(R)KLOTOGEN F—Stabilized Menadione Sodium Bisulfite, Abbott;
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CONGRESS

MEXICO CITY
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September 21-28
1958